THE JOURNAL OF SPEECH AND HEARING DISORDERS

Volume 17 December 1952 Number 4

Relations of Stuttering in Spontaneous Speech to Speech Content and Verbal Output
WILBUR E. MOORE, GEORGE SODERBERG and DONNA POWELL 371

The Differentiation of Interiorized and Exteriorized Secondary Stuttering
ERNEST DOUGLASS and BRUCE QUARRINGTON 377

An Investigation of Prognosis and Evaluation in Speech Therapy
GEORGE SHAMES 386

A Group Discussion Program with the Families of Aphasic Patients
MARTHA TURNBLOM and JULIAN S. MYERS 393

A 'Medicine Bag' for the Speech Correctionist
DOROTHY BELL and E. L. PROSS 397

The Influence of Certain Vowel Types on Degree of Harsh Voice Quality
DOROTHY SHERMAN and EUGENE LINKE 401

Accompaniments of Word Intelligibility
JOHN W. BLACK 409

Vocal Responses During Controlled Aural Stimulation
CHESTER J. ATKINSON 419

Parameter Relationships in the Portrayal of Signals with Sound Spectrograph Techniques
GORDON E. PETERSON 427

Letters to the Editor 433

Book Reviews, 436 Abstracts, 442

News and Announcements, 448

Convention Program, 454

Index to Volume 17, 460

EDUCATION LIBRARY

THE AMERICAN SPEECH AND HEARING ASSOCIATION

OFFICERS

President	Harold Westlake, Ph.D., Northwestern University
Executive Vice-President	Ernest H. Henrikson, Ph.D., Univ. of Minnesota
Vice-President	Stanley H. Ainsworth, Ph.D., Florida State Univ.
Secretary-Treasurer	George A. Kopp, Ph.D., Wayne University
Editor	Grant Fairbanks, Ph.D., University of Illinois

OFFICERS-ELECT

President-Elect	S. Richard Silverman, Ph.D., Cen. Inst. for the Deaf
Vice-President-Elect	Margaret Hall Powers, Ph.D., Chicago Pub. Schls.

COUNCIL

The Officers and the following Councilors:

Ollie Backus, Ph.D.	Eugene T. McDonald, D.Ed.
Spencer F. Brown, M.D.	Gordon Peterson, Ph.D.
Raymond Carhart, Ph.D.	M. D. Steer, Ph.D.
James A. Carrell, Ph.D	Charles Van Riper, Ph.D.
Myfanwy E. Chapman, M.S.	

APPLICATIONS FOR MEMBERSHIP SHOULD BE ADDRESSED TO THE SECRETARY-TREASURER

THE JOURNAL OF SPEECH AND HEARING DISORDERS

EDITOR

Grant Fairbanks, Ph.D.

ASSISTANT TO THE EDITOR

Elaine Pagel Paden, Ph.D.

ASSOCIATE EDITORS

Stanley H. Ainsworth, Ph.D.	Claude E. Kantner, Ph.D.
Clinical and School Problems	*Voice and Articulation Disorders*
Spencer F. Brown, M.D.	*Phonetics*
Psychological Problems	Hildred Schuell, Ph.D.
Medical Problems	*Organic Speech Disorders*
James F. Curtis, Ph.D.	S. Richard Silverman, Ph.D.
Speech Science	*Hearing Disorders*
Statistical Problems	*Psychoacoustics*

ASSISTANT EDITORS

Charles R. Elliott, M.A.	Martin F. Palmer, Sc.D.
News and Announcements	*Records*
Eugene T. McDonald, D. Ed.	Kenneth Scott Wood, Ph.D.
Abstracts	*Book Reviews*

BUSINESS MANAGER

George A. Kopp, Ph.D.

MANUSCRIPTS and related correspondence should be addressed to: Grant Fairbanks, Editor, *Journal of Speech and Hearing Disorders*, 321 Illini Hall, University of Illinois, Urbana, Illinois.

SUBSCRIPTIONS and orders for back numbers should be addressed to: George A. Kopp, Business Manager, *Journal of Speech and Hearing Disorders*, Speech Clinic, Wayne University, Detroit, Michigan.

NEWS and announcements should be addressed to: Charles R. Elliott, School of Speech, Northwestern University, Evanston, Illinois.

NOTICE TO AUTHORS

Before submitting manuscripts for publication authors should consult Information for Contributors to the Journal of Speech and Hearing Disorders, *JSHD*, 14, 1949, 93-94. Prospective authors are invited to write the Editor for copies of this Note, and of its supplement, Examples of Manuscript Form.

Relations Of Stuttering In Spontaneous Speech To Speech Content And Verbal Output

Wilbur E. Moore
George Soderberg
Donna Powell

SINCE THE FIRST studies of the relation between stuttering and various psychological phenomena were reported an impressive array of experiments has been interpreted to indicate that the following factors are associated with stuttering severity: 1. The loci of words on which stuttering occurs (*9*); 2. the expectation of stuttering (*11*); 3. general cues and specific cues associated with previous stuttering (*10*); 4. the grammatical function of the words on which stuttering occurs (*1*); 5. phonetic characteristics of the words on which stuttering occurs (*2*); 6. the position of the word in the sentence (*2*); 7. visual cues in the passage being read (*13*); 8. the loci of expectancy of stuttering (7); 9. communicative responsibility (*4*); 10. propositionality (*5*); 11. the adaptation to stuttering (*8*); 12. the size and personnel of the stutterer's audience (*14*); 13. predicted duration of the spasm (*18*).

Wilbur E. Moore (Ph.D., Iowa, 1936) is Director of the Division of Clinical Services and Head, Department of Speech and Drama, Central Michigan College of Education. George Soderberg (B.S., Central Michigan, 1952) is Assistant in Speech, Ohio State University. Donna Powell (B.S., Central Michigan, 1951) is Speech Correctionist, Dye Community School, Flint, Michigan.

The extent to which these and similar studies have contributed to the understanding of stuttering can hardly be overemphasized. On the other hand, their limitations cannot be ignored. The first and most apparent restriction of these studies is that they pertain chiefly if not solely to stuttering behavior in oral reading situations. Furthermore, the independent variate of reading skill has neither been controlled nor measured.

Another significant limitation of some of these interpretations is that the samples were too small to warrant the generalizations made. In some cases significant increases in stuttering frequency were based upon as few as six spasms.

A second group of studies has contributed many, but more equivocal, interpretations of the relationship between stuttering and attitudes or personality traits. Representative of this group are the studies of Schuell, Duncan, and Richardson, whose principal conclusions are respectively summarized as follows:

> Boys encounter more conflict and experience more insecurity than girls. . . . Their worries, concerned with money, jobs, and the future, seem to indicate a more basic insecurity. . . Stuttering, and

> the sex differences in the incidence of stuttering, can be accounted for by a combination of physiologically determined factors and responses to culturally-determined stimulus complexes which are different for girls and boys, for men and women (*16*).
>
> Stutterers are differentiated from non-stutterers on questions on home adjustment. In the Bell Adjustment Inventory they express lack of affection, love and understanding in their homes (*3*).
>
> The personalities of stutterers differ from the personalities of non-stutterers on measurements made by means of the Guilford STDCR, the Rorschach, and the Murray TAT. In general, stutterers are more socially introvertive, depressed, and less happy-go-lucky. They are also more constricted, tending to recognize neither their inner promptings nor the outside motivations (*15*).

Significant advances were made in exploring the personality of stutterers, but it should again be noted that the relationship between stuttering severity and the various attitudes or traits was not investigated.

These limitations reveal a need for research upon stuttering severity in spontaneous speech and for an exploration of the relationship between attitudes and the severity of stuttering. In an effort to meet this need the present experiment was undertaken. It was designed particularly for the analysis of covariance of the number of words spoken and stuttering severity, the latter being measured by the duration of spasms. The words were evoked by questions based upon a projective test of traits or attitudes, the Sacks Sentence Completion Test. This method of stimulating spontaneous speech made it possible to obtain a quantitative measurement between stuttering severity and certain attitudes. Specifically, the experiment was designed to yield data which would justify the rejection or acceptance of the following null hypothesis: There is no difference in the duration of stuttering spasms which occur in the spontaneous speech on six different topics.

It was also hoped that some light would be thrown upon the question whether the severity of stuttering, as measured by the duration of spasms, is related to verbal output.

Procedure

Sixteen male stutterers, 13 to 21 years of age, with I.Q.'s ranging from 90 to 133 were used as subjects. With the exception of four subjects, whose I.Q.'s were determined by the use of the Otis Quick Scoring Beta Test, the I.Q.'s were determined by the Wechsler-Bellevue Full Scale. The subjects participated in two controlled interviews: the first a 'buffer' or orientation interview to familiarize each subject with a tape recorder and to help him adjust to a situation in which his speech was being recorded; the second an experimental interview in which six pairs of questions probing the six topics (parents, hopes, fears, misdeeds, associates, and good times) were presented. Prior to the first interview each subject had taken a written sentence completion test which had covered the same areas, and thus had been given an opportunity to reflect upon the topics. Hence, no newness of content appeared in any question.

The interview was introduced by the following directions:

> I have a few questions which you may answer any way you like. What I say and what you say will be recorded on this machine. Your last name will not be used, nor will any part of what you say go into your clinical record, so feel perfectly free to say what you please.

The order of presenting the 12 questions was systematically varied from subject to subject so that the

order of presentation could not affect the results.

Immediately after the first period of questioning, the following instructions were given:

> Now I want to ask these same questions again, but I want you to tell me about things you didn't tell the first time. Think of other things than those you first told me and tell them as I ask each question.

The 12 questions were repeated with the modifier 'more' added to each.

After the second phase was completed, the following instructions were given:

> I am going to repeat each question. This will be the last time. Will you try to tell me some things you haven't yet told me about each subject I mention.

The questions were then repeated with the phrase 'still more' added to each.

The recordings were transcribed by the experimenter who was skilled in shorthand and were played and replayed until an accurate transcription of each was secured. These transcriptions were replayed by a second experimenter who checked for accuracy. The agreement on the transcription of the words was 99.6 per cent.

The measurements of stuttering duration were obtained in the following manner: The junior experimenter while listening to the tape recordings of the responses used a break circuit switch and stylus to mark the beginning and ending of each stuttering spasm on a polygraph tape moving at a constant speed of 16 mm per second. The duration limits of each spasm were then measured to the nearest mm.

The reliability of the junior experimenter's judgments of the duration of stuttering spasms was determined by calculating Pearson product-moment correlations of the measurements of four complete tapes selected at random with measurements made by the senior author. These coefficients were .80, .95, .94, and .91, the over-all correlation being .91. His reliability was further checked by correlating a first set of judgments of the duration of stuttering on four tapes with a second set. These coefficients were .83, .97, .96, and .93, the over-all coefficient being .93.

The basic measurements used in the analysis of covariance were the mean number of words and the mean duration of stuttering for the six responses to the paired questions. The smallest sample of words upon which a measurement of stuttering duration was based was 84.

TABLE 1. Analysis of covariance of number of words spoken and duration of stuttering.

Source of Variation	*df*	Sx^2 *Words*	*Sxy*	Sy^2 *Stuttering*	*Correlation*	*Regression Coefficient*	*Errors of Estimate*		
							Sums of Squares	*df*	*M Sq.*
A Parents	15	6024	3416	43115	.21	.5670	41178	14	2941.3
B Hopes	15	6592	5828	24539	.458	.8841	19387	14	1384.8
C Misdeeds	15	17426	11268	61997	.342	.6466	54711	14	3907.9
D Fears	15	14347	5265	47020	.202	.3669	45088	14	3220.6
E Associates	15	5111	1729	44760	.114	.3382	44175	14	3155.4
F Good Times	15	9660	7040	54836	.306	.7287	49705	14	3550.4
Total	90	59160	34546	276267	.270	.5839	254244	84	3026.7

TABLE 2. Calculation of adjusted mean durations of stuttering.

Question Topics	Mean Words Spoken X	Deviation from Experiment Mean x	Product bx†	Mean Duration of Stuttering Y	Adjusted Mean Duration Y-bx
A Parents	43.6	−.4	−.2	88.8 (1)‡	89 (1)‡
B Future hopes	34.5	−9.5	−5.5	49.7 (6)	55.2 (6)
C Misdeeds	52.9	8.9	5.1	72.9 (2)	67.8 (3)
D Fears	53.3	9.3	5.4	69.6 (3)	64.2 (4)
E Associates	38.8	−5.2	−3.0	65.4 (4)	68.4 (2)
F Good times	40.9	−3.1	−1.8	55.1 (5)	56.9 (5)
Sums	264.0*	0.0	0.0	401.5	401.5

*Mean words, 44.0.
†b=.584.
‡Rank.

Results

The 16 stutterers in their three responses to six pairs of questions spoke a total of 25,326 words and manifested a total stuttering duration of 38,532 mm (2,408 seconds).

The analysis of covariance of stuttering duration and the number of words is summarized in Table 1 and the non-adjusted and adjusted mean durations of stuttering as well as the means of the number of words spoken are given in Table 2. That the difference between the adjusted means of stuttering duration for the six different topics is not significant is shown in Table 3.

Although the over-all F of .922 indicates that so far as this study is concerned, the null hypothesis that there is no difference in the severity of stuttering on six different topics cannot be rejected, still the marked contrast between the stuttering on the topic Parents and that on the other topics combined cannot be disregarded. This difference is clearly shown in Figure 1. That it is safe to assume that a difference as great as this is not a chance one is defended both by Snedecor (*17*) and Fisher (*6*). At least the difference points to the need for further investigation. The results also show that severity of stuttering does not inhibit verbal output. The number of words

TABLE 3. Test of significance of differences among adjusted group means.

Source of Variation	df	Sum of Squares	Mean Square
Within topics adjusted for pooled within regression.	89	256094	2877.0
Within topics adjusted for individual regression.	84	254279	3027.1
Differences between regressions.	5	1815	363.0
Between topics adjusted for between regression.	4	11171	2792.5

F=2792.5/2877.0=.922 (non-significant)

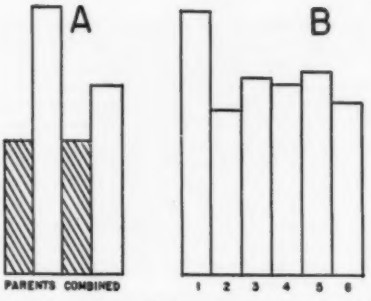

FIGURE 1. A. Relative mean number of words per question on parents and on all other topics combined (cross-hatched) and relative adjusted means of stuttering duration (open). B. Relative adjusted mean durations of stuttering per question on each topic. 1, parents; 2, hopes; 3, misdeeds; 4, fears; 5, associates; 6, good times.

spoken on the topic Parents was equal to that on the other five topics even though the duration of stuttering was significantly greater.

The highly consistent coefficients of correlation revealed by the analysis of covariance also indicates that the relation between the number of words spoken and the severity of stuttering is a highly stable one regardless of the topic of discourse.

In view of the pioneering nature of the investigation an analysis of error variance was made to determine whether the introduction of the independent variate, number of words, was worthwhile. The results of this analysis, which are summarized in Table 4, show that the mean square for error is reduced and that the reduction in the sum of squares due to regression is significant at the .01 level of confidence. This gain in precision indicates the need to retain the analysis of covariance in future experiments of a similar nature.

Conclusions

At present any conclusions must be viewed as tentative and suggestive. The present study does suggest that further investigation of the relationship between the topic Parents and stuttering severity is needed. The possibility that conceptual systems or constellations of ideas or values are related to stuttering severity cannot be ignored. The results of this study rather clearly indicate that a possible method for more precise investigation of relationships between personality traits or attitudes and stuttering severity may be found in the combination of projective tests, controlled interviews which are recorded, and an analysis of covariance.

In stuttering which occurs during spontaneous speech it seems highly probable that the relation between the duration of stuttering spasms and the amount of talk, although not high, is nevertheless significant and cannot be ignored. Furthermore, the relationship remains very stable if not constant.

Finally, it appears that stuttering

TABLE 4. Analysis of error variance in stuttering duration.

Source of Variation	*df*	*Sum of Squares*	*Mean Square*
Within topics, unadjusted measures	90	276,266	3,070
Reduction due to regression	1	20,172	20,172
	89	256,094	2,877

$F=7.01$ (significant at .01 level of confidence)

does not inhibit verbal output, that on topics on which significantly more stuttering occurs, the amount of talk is not reduced.

References

1. Brown, S. F. The influence of grammatical function on the incidence of stuttering. *JSD*, 2, 1937, 207-215.
2. ———. The theoretical importance of certain factors influencing the incidence of stuttering. *JSD*, 3, 1938, 223-229.
3. Duncan, M. H. Home adjustment of stutterers versus non-stutterers. *JSHD*, 14, 1949, 255-259.
4. Eisenson, J. and Wells, C. A study of the influence of communicative responsibility in a choral speech situation for stutterers. *JSD*, 7, 1942, 259-262.
5. Eisenson, J. and Horowitz, E. The influence of propositionality on stuttering. *JSD*, 10, 1945, 193-197.
6. Fisher, R. A. *Statistical Methods for Research Workers.* (6th ed.) Edinburgh: Oliver & Boyd, 1936.
7. Johnson, W. and Ainsworth, S. Studies in the psychology of stuttering: X. Constancy of loci of expectancy of stuttering. *JSD*, 3, 1938, 101-104.
8. Johnson, W. and Inness, M. Studies in the psychology of stuttering: XIII. A statistical analysis of the adaptation and consistency effects in relation to stuttering. *JSD*, 4, 1939, 79-86.
9. Johnson, W. and Knott, J. R. Studies in the psychology of stuttering: I. The distribution of moments of stuttering in successive readings of the same material. *JSD*, 2, 1937, 17-19.
10. Johnson, W., Larson, R. P. and Knott, J. R. Studies in the psychology of stuttering: III. Certain objective cues related to the precipitation of the moment of stuttering. *JSD*, 2, 1937, 23-25.
11. Knott, J. R., Johnson, W. and Webster, M. J. Studies in the psychology of stuttering: II. A quantitative evaluation of expectation of stuttering in relation to the occurrence of stuttering. *JSD*, 2, 1937, 20-22.
12. Lindquist, E. F. *Statistical Analysis in Educational Research.* New York: Houghton Mifflin, 1940.
13. Maddox, J. Studies in the psychology of stuttering: VIII. The role of visual cues in the precipitation of moments of stuttering. *JSD*, 3, 1938, 90-94.
14. Porter, H. v. K. Studies in the psychology of stuttering: XIV. Stuttering phenomena in relation to size and personnel of audience. *JSD*, 4, 1939, 323-333.
15. Richardson, L. H. A personality study of stutterers and non-stutterers. *JSD*, 9, 1944, 152-160.
16. Schuell, H. Sex differences in relation to stuttering: Part II. *JSD*, 12, 1947, 23-38.
17. Snedecor, G. W. *Statistical Methods.* (4th ed.) Ames: Iowa St. Coll. Press, 1946.
18. Van Riper, C. and Milisen, R. L. A study of the predicted duration of the stutterers blocks as related to their actual duration. *JSD*, 4, 1939, 339-345.

The Differentiation Of Interiorized And Exteriorized Secondary Stuttering

Ernest Douglass
Bruce Quarrington

TO SEEK an explanation of stuttering in terms of a symptom reflecting an underlying psychical disturbance would appear to be an extremely oversimplified approach to the problem in the light of present knowledge. Such a viewpoint cannot take into account many of the known facts about stuttering. The resistance of stuttering to psychoanalytic attack, the evidence of personality reorganization concomitant with improvement in stuttering with speech therapy, indicate the limitations of this view. The many studies demonstrating neurophysiological and genetic factors related to stuttering present further inadequacies. Perhaps the most important objection to a 'symptomatic' view of stuttering rests in its known developmental character. Stuttering is not a static characteristic but undergoes change from its earliest appearance in childhood until at least early adulthood. These changes appear to follow a fairly orderly sequence in most individuals. The shortcomings of the 'symptomatic' view of stuttering are most apparent here in its inability to account for the numerous changes in the character of stuttering at different stages in the development of the individual.

Froeschels (*4*), Stein (*10*) and others have offered rather extensive chronologies of stuttering characteristics. Such chronologies have not usually been content with mere description of the usual sequence of stuttering characteristics but have included attempts to explain the movement of the individual from one pattern of stuttering to another. There would appear to be rather general agreement that the course of development of stuttering from its earliest beginnings is a function of the social pressures that are brought to bear on the child and the child's personality (*11*). Many writers have stressed the impact of the parents and the greater social world in the development of stuttering (*6*). The personality of the stutterer as well as his social milieu must be taken into account. Stein (*10*) points out that the young stammerer showing initial clonic symptoms may react to parental admonitions in several ways depending on his relations with parents and his personality.

This sort of analysis of the stutterer permits one to consider the interplay of stuttering, genetic factors, characteristics, personality of the stutterer

Ernest Douglass (Licenciate of the Coll. of Speech Therapists, 1948) is Clinical Teacher in Speech Pathology, and Bruce Quarrington (M.A., Queen's Univ., 1947) is Clinical Teacher in Psychology, Department of Psychiatry, University of Toronto.

and his social world in the further development of stuttering. Such analysis can provide a dynamic basis for the development of therapetuic techniques for assisting the stutterer. In the past, however, there has been a tendency to devise development classifications that outrun our understanding of the psychological significance of the various phases and stages included. Classification at this point ceases to be instructive or helpful as far as treatment is concerned and satisfies only our aesthetic wishes for globality and orderliness.

Interiorization

Scattered throughout the literature on stuttering are references to 'hidden' or 'masked' stuttering. Hoepfner (*5*), Stein (*10*) and Froeschels (*4*) actually include masked stuttering as a later phase in the development of stuttering. Hoepfner pointed out that a tendency toward antisocial behaviour may result from concealed stuttering, while Stein, in discussing the psychological characteristics of such stutterers says:

> Feelings of inferiority and ill health, anxiety and strong emotions prevail, whereas motor speech symptoms are in the background. The power of judgment deviates from the normal social and moral behaviour deteriorate.

Freund (*3*), has written at some length on the problem, making reference to even earlier workers such as Denhardt (*2*) and particularly Ssikorsky (*9*) who as early as 1891 refers to the condition of 'internal' stuttering. Aside from the references quoted above a survey of the literature reveals little as to the psychosocial dynamics associated with this form of stuttering difficulty.

Over a period of two years the authors have encountered some 20 masked stutterers seeking treatment for their speech difficulties. These patients were subjected to the usual investigatory procedures used with stutterers in general. Case histories were taken by the speech pathologist covering normal and stuttered speech development, previous treatment, family, self and others' attitudes toward stuttered speech; wherever possible relatives were also interviewed. A psychological history dealt extensively with the social and vocational development of the patients. Autobiographies were obtained following a prescribed outline. Most of the interiorized entered upon treatment so that detailed analysis of stuttering devices were available as well as the usual clinical reports of the therapist. The observations and conclusions that follow are based on this material and were set forth as a conceptual framework within which further and more controlled studies could be pursued. The reader is therefore advised to regard our conclusions as tentative clinical formulations despite the unqualified manner of statement occasionally employed.

For purposes of distinguishing masked stutterers from secondary stutterers with overt verbal and motor manifestations the terms 'interiorized' and 'exteriorized' stutterers will be used.

The history of interiorized stutterers usually reveals that they were once 'bad stutterers' who have over the years 'got much better' according to their own testimony, although careful inquiry reveals that they were never as severe stutterers as their testimony might suggest. Their history shows that they experienced the primary phase of stuttering with onset between 3-5 years of age, followed by the gradual development of early secondary stuttering to the point of vocalized spasms of a comparatively mild nature. At this point the stuttering

was apparently perceived as being severe and strenuous efforts were made to cover the difficulty by the adoption of avoidance devices such as word substitution and circumlocution designed to mask the condition. With the passage of time a process that might be termed 'interiorization' has taken place in that the devices employed are subject to greater and greater refinement until eventually the devices actually used to avoid stuttering are both effective in preventing the appearance of overt stuttering and are socially acceptable. By socially acceptable is meant that the device is particularly suited to the speaking situation of the moment and is not likely to be reacted to by the auditors as an unusual or abnormal manner of speaking.

The interiorized stutterer is characterized by constant awareness of his speech difficulty and of stuttering threats contained in speaking situations. Constant preparedness, constant vigilance to guard against revelation of his stutter, complete avoidance of possible situations anticipated as threatening, are all evidenced. Every eventuality must be anticipated so that he can either avoid the danger entirely or meet it fully prepared. To be caught unprepared would be a tragedy. When stuttering cannot be warded off entirely, he then utilizes rather specific devices like coughing, blowing his nose, hand gestures, standing up and sitting down just at the 'right' moment. These and many other 'natural' movements used by normal speakers are adopted and adapted by the interiorized stutterer to disguise his stuttering moments. Indeed with enough restrictions, with some inhibitions, with enough 'dodges,' he succeeds in achieving his goal of avoiding overt stuttering.

The typical exteriorized stutterer fears moments of stuttering also and does his best to minimize the abnormality by the adoption of stuttering devices. These devices, when originally adopted, did in fact serve the intended purpose, that is, they facilitated oral expression. Constant exaggeration of the device, however, became necessary because, with frequent usage, it became automatic, losing more and more of its voluntary character and, hence, more and more of its effectiveness. In this way one habitual device is superimposed upon another forming a stereotyped habitual pattern of reaction to a stuttering threat. This adds to the overt abnormality of the stutterer but often without the stutterer's conscious knowledge and he does eventually succeed in expressing himself. Obviously he is embarrassed and fearful about the occurrence of his spasm, but he prefers to 'plough his way through' in spite of the apparent nature of his stuttering, because other goals are more necessary to him than hiding his stuttered speech. The main goal to him is self-expression and the main function of the devices he uses is to facilitate speech, although sometimes this is achieved only at great costs.

The behaviour of the two types, interiorized and exteriorized stutterers, is to be differentiated in numerous ways. They both fear entering speaking situations but mainly for different reasons. The interiorized stutterer's main concern is to avoid stuttering and he will sacrifice expression or any other sub-goal for achievement of his main goal if necessary. To the exteriorized stutterer, however, oral expression is the main goal and avoidance of stuttering a sub-goal. Another difference is that with any exteriorized stutterer who has been studied, one can predict with surprising accuracy what stuttering patterns he is likely to

display under given speaking conditions. A similar prediction is not possible, however, with the interiorized stutterer. He does not characteristically react in a stereotyped and involuntary manner, but uses his devices with much diversity and dexterity as seems appropriate to the circumstances and it is impossible to make accurate predictions as to his likely behaviour in any given circumstances.

This is not to say the interiorized stutterer never stutters verbally. If the pressure is great enough and the way of escape is impossible, or under strictly controlled experimental conditions, stuttered speech emerges with a severity quite equal to that of the typical exteriorized stutterer. It is as if the defences have broken down. The panic and consequent disorganized speech reactions are then quite evident. It is perhaps an observation of some significance that the stuttered speech pattern of the interiorized stutterer when it does emerge is of a catastrophic nature. Although comparatively short in duration, it is intense in severity and might be described as a 'true' spasm, that is, an involuntary muscular disruption, rapidly clonic in nature and usually confined to the sound that is being uttered. Eye closure and vasomotor changes are frequent components.

Personality Development

In considering the personalities of our interiorized stutterers clinically one cannot help but be struck by the consistency. The exteriorized group, while not presenting so high a degree of uniformity, have several characteristics in common that distinguish them from the interiorized group.

Our impressions are that interiorzed stutterers are characterized by sensitivity to their social world. They are very aware of the demands that social situations make upon them in the way of appropriate social behaviour. A heightened awareness of the social hierarchy in which they live and work is usually found and associated with this is their concern about their place in this hierarchy. Their relations with individuals in superior social positions are usually good. Most of their efforts in social situations seem to be directed towards their acceptance by those of superior status. Although they seem to have a very general need to belong and to be accepted by others, the focus for the realization of these needs is characteristically on individuals in positions of prestige or authority rather than on their fellows or peers. In social relationships our interiorized stutterers tend to be submissive or retiring. Their approach to the problem of winning and maintaining acceptance is by conforming behaviour in compliance with demands that social situations make of them. Characteristically they are anxious individuals who experience relatively few aggressive impulses. Aggressive behaviour in themselves or others tends to heighten their anxiety while conforming and complying behaviour tends to reduce their anxiety (See Figure 1).

The exteriorized group are much more heterogeneous, but there are some generalizations that appear to

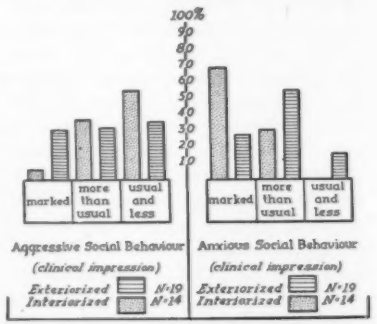

FIGURE 1. Clinical ratings of anxious and aggressive social behaviour in interiorized and exteriorized stutterers.

hold up quite well. In general, our exteriorized stutterers are not anxious about how they are perceived by others. There would seem to be an implicit assumption on their part that they are accepted by others. According to their own testimony, their relationships with their peers are usually better than with those in superior social positions. Authoritarian or prestigeful individuals are frequently seen as threatening rather than sources of satisfaction; their orientation towards such individuals is often an aggressive one. Whereas our interiorized stutterers' dominant psychological needs seem to be a matter of how they are perceived by their social world, the exteriorized stutterers' dominant needs seem to be concerned with the nature of the impact they are making in their social world. The exteriorized stutterer is most typically concerned about realizing his personal needs for material symbols of prestige and status. He usually thinks of himself as a rugged individualist who does not feel compelled to conform to the demands of a social situation should they run counter to his personal ambitions. The resentment and rejection that he might arouse in others as a result of his aggressive manner of obtaining satisfaction in respect to wealth and power is a matter that often eludes the exteriorized stutterer and is rarely in the foreground of awareness. Typically, the exteriorized stutterer shows greater spontaneity in responsiveness to his social world and the interiorized stutterer tends to be more dominated by the internalized goals and values of his society.[1]

It is evident from the descriptions above that strivings for prestige and higher social status are characteristics that are attributed to both interiorized and exteriorized stutterers. This may be a characteristic that is only found with stutterers that come to clinic for treatment, who seek help with their stuttering in order to struggle more successfully for upward social mobility. Not all our stutterers, however, are socially mobile. We have many cases where the motivation prompting the patient coming to clinic seems quite unrelated to status strivings. All these cases, it should be noted, are exteriorized stutterers. All our interiorized have proved to be socially mobile individuals. Patterns of mobility strivings differ markedly among interiorized and exteriorized patients both in terms of underlying motivation and in terms of actual mobility processes.

The interiorized stutterer appears to come from a family that is upwardly oriented and employs child-rearing practices and methods of discipline particularly suited to the development of a child who will strive to maintain and enhance the social status of the family. Moral training in such a family is by means of anxiety-producing threats to withhold affection or actual withholding of affection until the child conforms with the expectations of the parent.[2]

Parental expectations in such upwardly oriented families are characteristically high in respect to most aspects of the child's life. In respect to bladder and bowel training, sports, school achievement and many other areas of life, such parents expect continuous improvement in performance, with the level of achievement or ma-

[1] Preliminary results of a study recently carried out with Rorschach, Thematic Apperception and other tests, confirm the differences in personality attributed to exteriorized and interiorized stutterers. To be published.

[2] The view of anxiety subscribed to here is one that regards anxiety as a biologically-rooted drive that in the socialization of the child becomes conditioned with objects, symbols and events and produces behaviour that is anxiety reducing in character and hence rewarding (*1, 8*).

turity always greater than the child's age warrants. From an early age a child in such a family learns that social acceptance and emotional security is to depend on successful striving to conform to the expectations that others have of them and to achieve goals that parental or other authoritarian figures set for them. Our interiorized stutterer always appears to have developed in such a background. As adults, they present a picture of reasonably successful examples of social mobility. Both in their community and in their occupational life they usually have positions of considerable status and prestige. The material gains that they have personally made in their upward social strivings are socially consolidated, but it is important to note this consolidation is felt to be dependent on their successful concealment of stuttering. Anything that makes for overt manifestation of stuttering (including treatment) tends to be regarded as having a catastrophic character.

Our exteriorized patients do not usually show a family background that is upwardly oriented. Some of our exteriorized come from lower class families, some from upper class families, some from middle class families that do not appear to have strong mobility aspirations. One or two of our exteriorized have come from families that were strongly upwardly oriented, but in these cases it is clear that they rejected their families and family values and have, in fact, developed a very general pattern of social isolation. Generally speaking, however, the families of the exteriorized stutterers do not appear to exert strong pressures towards conformity or towards high level of achievement. Threats of emotional deprivation do not appear to be used frequently in disciplining the child. This would seem to be related to the exteriorized stutterer's relative lack of concern with the matter of social acceptance and his lack of emphasis on social conformity and compliance. Many of our exteriorized stutterers are clearly not socially mobile. In patients showing upward strivings the emphasis is on the acquisition of the material symbols of higher social status and the consolidation of any such material gains into terms of social acceptance by those in superior status positions tends to be neglected. Thus, the strivings for social mobility of the exteriorized are not successful, since they are not accompanied by identification with those in superior status nor by a change in values or social behaviour appropriate to this new position of prestige. Understandably, the individual is not generally accorded the social status which his material status might warrant under other circumstances. The underlying motivation of mobility strivings of the exteriorized would not appear to be due to the values acquired from his family but more characteristically to personal values and goals he has acquired in his later social development.

Consideration of the case histories of our stutterers indicates that the families of the interiorized patient show earlier and greater concern with regard to speech behaviour than do the families of the exteriorized. This difference in tension experienced by the parents of interiorized and exteriorized stutterers is reflected in their ability to remember the early history of their child's stuttering difficulty. When interviewing the parents of interiorized patients, it is not difficult to get an elaborate account of the speech of their child during the primary stage, whereas most parents of exteriorized patients have difficulty in giving an account of speech development until the onset of the secondary

features. This supports the difference and concern inferred from our patients' own accounts of family life as a child. It would appear that as children, strong and consistent efforts are made by the parents of interiorized stutterers to conceal their stuttering. Emotional tension behind these efforts increases as the child develops and begins to play more important social roles. In a sense, these efforts are rewarded if the child manages to conceal stuttering to a considerable extent, even though his very efforts to conceal may result in secondary stuttering. It has been noted that the secondary stage in interiorized stutterers is objectively not as severe as in the exteriorized. As the interiorized stutterer develops he acquires more and more tricks to conceal his stuttering. This sort of learning understandably goes on at a more rapid pace under conditions provoking even higher levels of anxiety. This accounts for the statements of interiorized patients to the effect that they suddenly got better when they began University, or when they began an important job, or joined a new club. With all of these events they experienced greater anxiety because of the social significance they had for them.

The tension underlying the parents' and later the interiorized stutterer's own efforts to conceal stuttering is understandable when one takes into consideration their aspirations of social mobility. Successful mobility striving is dependent on the individual acquiring behaviour, values and goals that are characteristic of the individuals of higher status by whom the upwardly mobile person must be accepted. In this process of learning new behaviour and feelings, it is important that the individual cast off inappropriate behaviour and values that he might manifest. Such behaviour would likely attract attention to himself if expressed and this attention might lead to more careful consideration of the individual and even rejection on the part of those of superior status with whom the mobile individual seeks to identify himself. Thus, he must attempt to control and conceal such inappropriate behaviour and feelings. In our opinion, stuttering is one of several stigmata that might attract critical attention, and accordingly, that must be concealed. Differences of any sort of the upwardly mobile individual from the group in which he seeks acceptance must be suppressed (7). Thus, the efforts of the interiorized stutterer are directed, primarily, towards the concealment of overt evidence of stuttering.

It is our contention that the development of secondary stuttering in our exteriorized patients is primarily due to their efforts to facilitate their verbal self-expression. The penalties that appear most important in the development of the exteriorized child are those that result in social suppression or restriction of their self-expression. These restrictions become more numerous as the child becomes active socially outside the family. As he begins high school, work, etc., his reaction to such restrictions is an aggressive, self-assertive one and he begins to employ devices to break through speech blocks and thus express himself. The objective here is to maintain the attention of his auditors so that his ideas, opinions, suggestions, will have the impact that he anticipates. Excessive stuttering is characteristically reacted to as failure to realize oneself and is usually accompanied by anger directed towards self and auditors but not accompanied by the excessive anxiety that our interiorized stutterer would experience in such a situation.

It is interesting in this respect to compare the reactions that interiorized

and exteriorized patients evidence when first confronted with a recording or film of themselves stuttering. The exteriorized patient, although objectively a severe stutterer, finds it difficult to believe that he actually sounds or looks as abnormal as these devices show him to be. The interiorized, on the other hand, although showing a performance that makes difficult the detection of stuttered speech, will usually react on self-confrontation with great concern at the abnormality shown. The self-concept of the exteriorized would seem to allow him to stutter without suffering feelings of being markedly 'different' from others, whereas the self-concept of the anxious interiorized stutterer sets him to react to extremely small abnormalities with anxiety and feelings of being different.

Development of Stuttering

Our observations confirm the findings of other workers that stuttering at its onset is predominantly a disorder of childhood and is characterized by reiterative speech responses termed 'clonus' during the primary stage (See Figure 2). With increasing age, maturation takes place in many cases and normal speech develops, but in some cases the repetitive type of speech gives way to prolonged articulation termed 'tonus' and this, in our opinion, represents the emergence of the first phase of the secondary stage (See Figure 2). The tonic speech spasms during this phase appear to be confined to the articulators so that respiration and phonation continue, resulting in prolonged vocalized speech sounds. This character of stuttered speech may continue throughout life becoming more severe only in prolongation of vocalization. Some secondary avoidance devices and somatic struggle reactions may develop, but these are comparatively mild and localized in nature comprising, for instance, intermittent eye closure when the prolonged articulations grow too prominent. We have termed this course of development vocalized secondary stuttering (See Figure 2). It constitutes one sort of exteriorized stuttering.

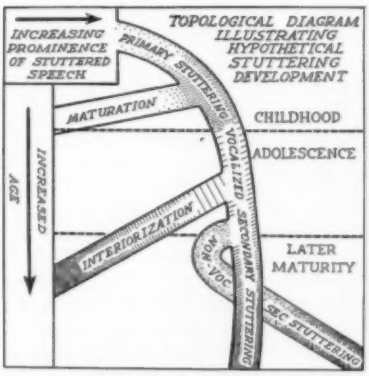

FIGURE 2. A formulation of the various developmental courses of stuttering.

During the first phase of the secondary stage many stutterers react to the prolonged vocalization as being excessive and learn to suspend vocalization before a stuttering moment. Temporary suspension of vocalization is immediately rewarding since it minimizes the overt abnormality. The period of fluency achieved through such devices is usually short-lived. The efficacy of the device deteriorates and the suspended moment grows longer. From the tonic spasm of the articulators the locus of spasms grows to include the phonatory and respiratory mechanisms. The period of suspension growing longer gives rise to desperate efforts to terminate it and these overt struggle reactions are highly idiosyncratic and often bizarre. This sort of person we refer to as a non-vocalized

secondary stutterer and belongs in the exteriorized group (See Figure 2).

In the interiorized stutterer one usually finds that his 'control' over stuttering appeared with the suspension of vocalization before a stuttering moment. Unlike the non-vocalized stutterer, the interiorized goes on to develop still further devices which help him avoid stuttering in an appropriate fashion from situation to situation. The personal cost of complete avoidance is great but the interiorized stutterer can acquire the semblance of fluency.

References

1. Davis, A. Socialization and the adolescent personality. In *Forty-Third Yearbook of the National Society for the Study of Education.* Part I, 1944, 198-216.
2. Denhardt, R. *Das Stottern, eine Psychose.* Leipzig: Ernest Keil's Nachf., 1890.
3. Freund, H. Uber inneres Stottern. *Z. ges. Neurol. Psychiat.*, 151, 1934, 591-598.
4. Froeschels, E. *Twentieth Century Speech and Voice Correction.* New York: Philosophical Library, 1948.
5. Hoepfner, T. Zur Clinic und Systematic der associativen Aphasie. *Z. ges. Neurol. Psychiat.*, 79, 1922, 1-45.
6. Johnson, W. *People in Quandaries.* New York: Harper, 1946.
7. Miller, N. A. and Dollard, J. *Social Learning and Imitation.* New Haven, Conn.: Yale Univ. Press, 1941.
8. Mowrer, O. H. On the dual nature of learning: A re-interpretation of 'conditioning' and 'problem-solving.' *Harv. educ. Rev.*, 17, 1947, 102-148.
9. Ssikorsky, J. A. *Uber das Stottern.* Berlin: August Hirschwald, 1891.
10. Stein, L. *Speech and Voice.* London: Methuen, 1942.
11. Wyatt, G. L. Stammering and language learning in early childhood. *J. abnorm. soc. Psychol.*, 44, 1949, 75-84.

An Investigation Of Prognosis And Evaluation In Speech Therapy

George Shames

ALTHOUGH THE problems of case selection and prognosis have become acute in the field of speech therapy, this area has not been the focus of research. One might expect that more attention would have been given to these problems, since the results could have such widespread and practical applications. There are no doubt many reasons for this paucity of data. Much of the research in this field has of necessity dealt with investigations of crucial variables which help identify and classify speech defectiveness. Other investigations have considered the efficacy of various therapeutic procedures. Still others have described surveys of populations and clinical facilities. It seems to this writer that two of the more important reasons for not having had research on prognosis are the lack of description and definition of speech defectiveness in universally accepted terminology, and the lack of valid and reliable measurements of the effects of speech therapy. Until the changes obtained between pre-therapy and post-therapy behavior can be measured, and it can be determined in a reliable and non-subjective way who is successful and who is not successful, very little can be predicted about success.

George Shames (Ph.D., Pittsburgh, 1952) is Assistant Professor of Psychology and Clinical Supervisor, University of Pittsburgh. This article is based on a doctoral dissertation completed under the direction of Professor Jack Matthews.

The present study was undertaken to investigate the value of various biographical and personality factors as predictors of success in speech therapy. It was felt that such biographical factors as a person's age, education, socio-economic status and family history might be related to his progress in a speech clinic (*2, 12, 13*). In addition, such pre-therapy psychological factors as depression, social adjustment, attitude about the problem, and emotional adjustment might also be of value as predictors (*1, 4, 5,* 7). These factors, together with samples of pre-therapy test performances, were studied.

Since prediction of success necessitates classifying people as successful or unsuccessful, a major portion of the study was devoted to exploring several techniques of estimating success in speech therapy. The prognostic values of the various factors were determined on the basis of these estimates.

Procedure

Examination of literature and research in the field of psychology revealed several general operating principles for the selection of criteria for success in therapy. It was found that the psychological problems manifested were described either in terms of existing symptoms or in terms of etiology. Goals of therapy were established in terms of alleviation of these

symptoms, and therapeutic procedures were instituted which were geared to the attainment of these goals. The success of the therapeutic procedures was then evaluated by measuring the degree to which these goals were attained (degree of alleviation of manifested symptoms).

Analysis of commonly accepted statements, descriptions and definitions of defective speech (*14*), led this writer to the belief that the problems existing with people having defective speech manifested themselves through symptoms of speech inadequacy and social inadequacy. Since there is very little conclusive evidence concerning etiology, it seems that the goals of speech therapy and the therapeutic procedures employed have had to deal with the alleviation of symptoms. For this study, the success of speech therapy was evaluated in terms of the degree of alleviation of symptoms of speech inadequacy and social inadequacy.

The subjects for this research were 37 individuals who had speech problems and had attended the speech clinic at the University of Pittsburgh for intensive speech therapy. There were 27 stutterers, two voice problems, and eight articulation problems of which four also had cleft palates. They were both male and female, married and single, Negro and white, and ranged in age from 16 to 40 years.

The therapy at the University of Pittsburgh speech clinic was of an intensive nature, geared to the social use of speech. The subjects attended individual and group therapy sessions for approximately five hours a day, five days a week, until in the opinion of the staff, an insurmountable plateau in progress had been reached. These sessions were both structured and unstructured. Opportunity was provided for specific speech habit retraining, socialization, mental hygiene, individual counseling, and carry-over of new speech habits into social situations, both clinical and non-clinical. The subjects went through therapy in small groups of from seven to 12 people.

Measurement of the Symptoms. Using previous research in the area of evaluation of psychotherapy as a guide, several techniques were employed for measuring the symptoms of social inadequacy and speech inadequacy. These techniques involved the use of rating scales, a questionnaire (*6*), and a projective test (*8*). Since the reliability and validity of none of these techniques have been conclusively established, it was felt that the influence of the deficiencies of any one of these techniques on the determination of the prognostic value of the factors being studied would be minimized if more than one technique were used.

Speech Adequacy. The speech adequacy of the subjects was measured by presenting randomly pre- and post-therapy recordings of their speech to two speech clinicians who were unfamiliar with the subjects. They were asked to indicate whether the speech on the second recording was better, the same, or worse than the speech on the first recording. In this way, comparisons of pre-therapy speech behavior with post-therapy speech behavior were obtained. The correlation between the judgments of the two clinicians was .57. The group of 37 subjects was then divided at the median composite rating of the two judges into a 'most successful' and 'least successful' group.

Social Adequacy. Three techniques were used to measure changes in social adequacy. These techniques made

use of a rating scale, the Guilford-Martin Inventory of Factors STDCR (*6*), and the Rorschach test (*8*).

A rating technique of measuring avoidance of social situations was employed in which three speech clinicians (not the same ones judging speech) directly observed the spontaneous social behavior of the subjects. They rated the subjects on a five-point scale (five representing very much avoidance and one representing very little avoidance), before and after therapy, on how much they avoided social situations (*10, 11*). The average interjudge correlation for pre-therapy ratings was .69. The average inter-judge correlation for post-therapy ratings was .72. By adding together each of the three judge's ratings for each subject, composite scores were obtained for each subject before therapy and again after therapy. The discrepancy between the subject's composite pre-therapy rating and his composite post-therapy rating was determined, resulting in a 'change score' in social avoidance.

The group of 37 subjects was then divided at the median change score with those showing the highest change scores being in the 'most successful' group and those showing the lowest change scores being in the 'least successful' group.

Factor S, social introversion, from the Guilford-Martin Inventory of Factors STDCR was used to obtain a questionnaire measure of social adequacy, before and after therapy. By administering this test twice to 74 introductory psychology students, with a three month interval, a test-retest reliability coefficient of .90 was obtained. The test was administered to the subjects before and after therapy, and the discrepancy between their two scores on Factor S was determined. The group was again divided at the median change score, with those showing the highest change score being in the 'most successful' group and those showing the lowest change score being in the 'least successful' group.

The projective technique involved administering the Rorschach test before and after therapy. The 17 Davidson signs of adjustment were used to interpret the test (*3*). The number of individual signs were summated for each protocol, and a composite adjustment score was obtained for the pre-therapy and the post-therapy Rorschachs. These individual signs of adjustment have shown measures of internal consistency in other research projects up to .78, and test-retest correlations for the composite scores up to .64.

The discrepancy between the number of signs of adjustment on the pre- and post-therapy tests was determined and resulted in a change score for each subject. As before, the median change score was used to divide the group into 'most successful' and 'least successful' groups.

Being in the most successful group for one of the four criteria did not preclude the same classification on the other criteria. Only negligible correlations were found to exist between measures of speech adequacy and the three measures of social adequacy. The same was true of correlations between the projective technique (Rorschach) and the other three measures of success. There did exist, however, statistically significant correlations between pre-therapy ratings of social avoidance, and pre-therapy Factor S scores, as well as between post-therapy ratings of social avoidance and post-therapy Factor S scores. The pre-therapy correlation was .45. The post-therapy correlation was .33. The

correlation between the change scores of the two techniques was .43. All of these correlations were significant at the 5% level of confidence or better.

Prognostic Indicators. Forty variables were studied for their prognostic value for speech therapy. Nine of the variables were of a biographical nature and were obtained from the case histories of the subjects:

Having previous therapy
Socio-economic status
Coming from a broken home
Education
Type of speech problem
Family history of problem
Residence during therapy
Age
Foreign language in the home

The other factors that were studied were obtained from pre-therapy rating scales, questionnaires and psychological tests. All of these factors dealt with various aspects of personality. Specifically, they were the factors measured by the Guilford-Martin Inventory of Factors STDCR, by the Bell Adjustment Inventory, by the Rorschach test, by an Attitude Toward Speech Difficulties Scale, and by ratings of behavior by clinicians:

Rating of social avoidance
Factor S, social introversion
Factor T, thinking introversion
Factor D, depression
Factor C, cycloid tendencies
Factor R, happy-go-luckiness
Attitude toward speech problem
Home adjustment
Health adjustment
Social adjustment
Emotional adjustment
Occupational adjustment
Total Bell Adjustment
Sum $C > Fc+c+C'$
P, 4 or more
F%, 50% or more
M, 3 or more
$Dd+S$, 10% or more
$M > FM$ or equal FM
R, 20 or more
$FC > CF$ or equal CF
FC, 2 or more
No pure C
% R to 8, 9, 10, 30%
$FK+Fc$, 2 or more
$W:M$ equals 2:1
A% equal 50% or less
No color shock
No shading shock
No rejections
Total Rorschach adjustment score

Results

The chi-square technique was used to determine whether a statistically significant relationship existed between each of the 40 variables and success on each of the four evaluations of speech therapy (*9*). Therefore four chi-squares were computed for each of the 40 variables, or 40 chi-squares for each of the four criteria of success. A total of 160 chi-squares was computed. It could be expected that by chance alone, 16 of the potential prognostic variables could have chi-squares significant at the 10% level of confidence. It was found that only 11 variables were significant at this level of confidence. Therefore, conclusions concerning the prognostic value of even these 11 variables should be formulated cautiously. In Table 1 are listed these 11 variables and the p-values of their chi-squares.

The biographical variables showing relationships significant at the 10% level of confidence or better on at least one criterion of success were: not having previous therapy; having foreign language in the home; and being in the middle socio-economic class.

The personality factors showing relationships significant at the 10% level or better were Factors STR from the Guilford-Martin Inventory. Factor S, social introversion, was significant at the 1% level, while Factor T, thinking introversion, and Factor R, happy-go-luckiness, were significant at the 9% level. Manifesting a great deal of

TABLE 1. Probabilities for chi-squares for 11 prognostic variables.

Prognostic Variables	*Criteria*			
	Social Adjustment			*Speech Adequacy*
	Rating Technique	*Questionnaire Technique*	*Projective Technique*	*Rating Technique*
Social Avoidance	.01			
Factor S	.23	.01		.22
Previous Therapy		.25	.02	
Foreign Language in Home			.08	
Factor T				.096
Factor R				.096
Socio-Economic Status				.034
Sum $C > Fc+c+C'$			.07	
P, 4 or more		.099		
F%, 50% or less			.06	
M, 3 or more	.23		.08	

introversion, and very little happy-go-luckiness before therapy seemed to be related to success.

Four individual signs of adjustment from the Davidson sign system on the Rorschach test were also significantly related to success at the 9% level of confidence or better. The absence of these signs in the subjects' pre-therapy Rorschach protocols was the direction of the relationship. These signs are listed in Table 1.

Pre-therapy ratings of social avoidance by clinicians had a chi-square significant at the 1% level, and indicates that high pre-therapy ratings (much avoidance) could be related to success.

It can be further noted from Table 1 that one variable had a significant chi-square on the rating technique of estimating success (at the 1% level), two variables had significant chi-squares on the questionnaire technique (1% and 9% levels), five variables had chi-squares significant on the Rorschach technique (at the 2%, 6%, 7% and 8% levels), and three variables had significant chi-squares on the criterion of judging speech adequacy (at the 3%, and 9% levels).

Discussion

In interpreting the results of the study, several factors are suggested as being serious limitations. It is hoped that future research on prognosis can better control these limitations.

The size of the sample, 37, was far from representative of individuals with speech problems. The small *N* made statistical treatment quite difficult, and narrowed the range of factors which were investigated. For this reason such seemingly relevant biographical factors as sex, marital status, religion, etc. were not amenable to study. There were not enough samples to enable comparisons on these factors.

The presence of different types of speech problems greatly influenced the procedures employed in judging the recordings of speech. Very little definitive structure was given to the judges of speech adequacy concerning the criteria they used for their ratings.

It is possible that the use of only one type of speech problem in such a rating procedure could result in more definitive criteria and more reliable ratings.

Another limiting factor was the dissimilarity of the various groups in which the subjects underwent therapy. All of the subjects were not exposed to the same therapeutic climate. These small groups had varying ranges in age, type of problem, socioeconomic levels, education and race. It is possible that individual progress was influenced by the operation of these factors of group homogeneity.

Prefacing all thought and conclusions with the aforementioned limitations, it can be stated that 11 of the 40 variables investigated showed trends toward having some prognostic value for speech therapy. Although it would be dangerous to permit the results of this investigation to influence clinical procedures, they definitely suggest further investigation, not only of the 40 variables, but of the criteria for improvement in speech therapy.

Several tentative conclusions present themselves as explanations for these findings. One is that the variables studied are actually not related to progress in speech therapy. This conclusion is not supported by clinical observation, however, and suggests that these variables are deserving of further study.

Another conclusion could be that the areas selected as reflecting the goals of therapy and the therapeutic procedures are either not valid, or are incomplete. Careful analysis of these two processes tend to support the selection of social adequacy and speech adequacy as the appropriate criteria for determining progress in speech therapy. It is possible, however, that further analysis will reveal other criteria.

Still another conclusion that is strongly suggested is that the measurement of these criteria was inadequate in both the types of instruments used and the methods employed in the interpretation of these instruments. Speech adequacy was measured by quantifying the judgments of speech clinicians based on one listening of a small, unrepresentative sample of recorded speech. The sample was very remote from everyday speech as it is encountered in the routine of the subject's environment, and the validity of this type of measure is questionable.

In measuring social adequacy, the Guilford-Martin questionnaire, the Rorschach test and a rating scale were used. The validities of none of these instruments have been established, and they may not reflect the social adequacy of the subjects.

The rating scale measure of avoidance of social situations made use of unsystematic, global observations of the subject's behavior, due mainly to economic limitations of time and space in the clinical situation. It might be possible to refine the observation procedures and give the observers a more definitive frame of reference, in terms of specific behavior.

In an effort to quantify the results of the Rorschach test, a sign approach was used to establish a numerical representation of the subject's adjustment. This procedure does not represent the usual clinical handling of the Rorschach test, in which consideration is given to the whole protocol. It is possible that a distorted picture of the subject's social adequacy was obtained by ignoring the qualitative elements of this test.

Although five variables were iden-

tified as showing relationships significant at better than the 10% level of confidence with the Rorschach technique of estimating success in speech therapy, and only one variable was identified with the rating technique of estimating success, it would be erroneous to attach a great deal of significance to this difference. The results do not indicate that any of the techniques explored were significantly different from one another in terms of validity and reliability.

The results could be indicative of trends toward prognostic value for 11 of the 40 biographical and psychological variables studied. In addition, the methods employed demonstrate that research on prognosis and measurement of therapy can be carried on without disturbing the clinical situation. The effects on both research procedure and clinical procedure, however, of the suggested refinements of these methods should be considered in any future research on prognosis or measurement of speech therapy.

References

1. Ackerman, W. *Some Theoretical Aspects of Group Psychotherapy, A Symposium.* New York: Beacon House, 1945.
2. Alexander, F. and French, T. *Psychoanalytic Therapy: Principles and Application.* New York: Ronald Press, 1946.
3. Davidson, H. A measure of adjustment obtained from the Rorschach Protocol. *J. proj. Tech.*, 14, 1950, 31-38.
4. Ford, C. Some components of 'lack of cooperation' among adult patients of a mental hygiene clinic. *Smith Coll. Stud. soc. Wk*, 13, 1942, 188-189.
5. Glassman, L. Is dull normal intelligence a contraindication for psychotherapy? *Smith Coll. Stud. soc. Wk*, 13, 1943, 275-298.
6. Guilford, J. An inventory of factors STDCR. Beverley Hills, Calif.: Sheridan Supply Co., 1940.
7. Harris, R. and Christiansen, C. The prediction of response to brief psychotherapy. *J. Psychol.*, 21, 1946, 269-284.
8. Klopfer, B. and Kelley, D. *The Rorschach Technique.* New York: World Book Co., 1946.
9. Lewis, D. and Burke, C. The use and misuse of the chi square test. *Psychol. Bull.*, 46, 1949, 433-489.
10. Likert, R. A technique for the measurement of attitudes. *Arch. Psychol.*, 22 (140), 1932, 5-55.
11. Likert, R., Roslow, S. and Murphy, G. A simple and reliable method of scoring the Thurstone attitude scales. *J. soc. Psychol.*, 5, 1934, 228-238.
12. Malamud, W. and Malamud, I. Sociopsychiatric problems in rehabilitation. *Dis. nerv. Syst.*, 6, 1945, 134-142.
13. Slavson, S. *An Introduction to Group Therapy.* New York: Commonwealth Fund, 1943.
14. Van Riper, C. *Speech Correction, Principles and Methods.* (2nd Ed.) New York: Prentice-Hall, 1947.

A Group Discussion Program With The Families Of Aphasic Patients

Martha Turnblom
Julian S. Myers

THE DYNAMIC interaction between the aphasic patient and his family can be of vital importance in setting the atmosphere and determining the motivation for rehabilitation. The patient must cope not only with the problems of communication and reduced intellectual efficiency, but also with the effects of chronic physical disability, including limitations in motor functioning, restricted ambulation and traveling, and increased dependency upon others. Almost invariably, this produces a lowering of the emotional threshold and intensification of the emotional reaction. The immediate family cannot help being affected by the resultant behavior.

On the other hand, the family faces problems of equal concern. A former healthy and independent member, possibly the breadwinner, suddenly becomes highly dependent. Feelings of pity and hostility, shame and guilt may all develop, depending on the emotional maturity of the individuals. These feelings easily become intensified by the added financial burden, uncertainty as to length and type of treatment, ignorance of limitations, precautions and prognosis, and by indecisiveness over the individual's own role. These emotional disturbances in the family will quickly be reflected in the patient's outlook and motivation.

The group discussion program for the relatives of aphasic patients at the Institute of Physical Medicine and Rehabilitation was initiated to deal with the many inquiries concerning treatment and management which were made by the relatives. Although the requests were ostensibly for factual information, the questions appeared to reflect basic anxiety and uncertainty in the family-patient relationship. Reassurance seemed to be sought as often as information. In addition, questions from different individuals indicated that they shared many problems in common.

The objectives of the program were (1) to educate and orient the participants as to the nature of aphasia and the rehabilitation process; and (2) to help them to improve their emotional adjustment to the situation that existed in their family.

The group discussion method was chosen in preference to the lecture

Martha Turnblom (B.S., Mich. State, 1949) is Chief, Speech and Hearing Therapy, Institute of Physical Medicine and Rehabilitation, New York University-Bellevue Medical Center, and Julian S. Myers (M.A., Teachers Coll., Columbia, 1942) is Clinical Psychologist, The Burke Foundation, White Plains, New York. This article is adapted from a paper presented at the 1951 Annual Convention of ASHA, Chicago, Ill.

method since it was felt the former would have more psycho-therapeutic value and thus be more effective in achieving the second objective. For the same reason, meetings were kept on an informal level and maximum group participation was encouraged. Participants were urged to express their own feelings and to give their reaction to the experiences of other members. The psychologist and speech therapist acted both as moderators and discussants, being careful not to monopolize the discussion. Sessions were started by brief orientation periods. As new topics were brought up, one of the staff members would explain the technical aspects. Other educational material was presented in response to questions, to clarify misconceptions, or to explain the behavior of a patient. Generally, members of the group brought up topics for discussion spontaneously. When the conversation lagged, the staff members introduced new topics.

Education and Orientation

Those areas which were covered by group discussion may be considered somewhat arbitrarily under three broad, overlapping categories: medical treatment, speech therapy and psychological adjustment. The more important topics discussed are presented below together with some brief comments describing the attitudes of the relatives and staff members.

Medical Treatment. A staff physician attended one session to answer medical questions. Many members of the group were interested in knowing when rehabilitation should be started. In this regard they mentioned their concern over physical limitations and the medical precautions which had to be taken with each patient, particularly immediately following the acute phase of illness. Some of the wives contributed information regarding their own experiences with fatigue in the brain-injured patient. It was pointed out that overexertion, fatigue and excitement should be avoided in dealing with this type of patient.

The goals of the medical program were discussed briefly. The objectives stressed were the ability to ambulate, to perform the activities of daily living and to achieve maximum independence. Following the first meeting they were taken on a tour of the rehabilitation center where they could see the re-education program in action.

The prognosis of hemiplegia was of interest to the discussants. They expressed interest in knowing how long the rehabilitation process should take; and, although the staff members stated that the average length of stay at the rehabilitation center is about two months, they emphasized that it is impossible to determine how much time any individual patient will take before a maximum level of performance is achieved.

Speech Therapy. Since the group consisted of relatives of speech patients, questions regarding language rehabilitation were treated very fully. The incidence of automatic speech and profanity was considered in terms of how the family should react to this behavior in the home setting. In this regard, the patient's inability to inhibit and censor following brain injury was discussed.

The nature of aphasia and its related disturbances was treated in nontechnical language, including the different kinds of aphasia, their etiology, current practices in the field of aphasia therapy, the role of the speech therapist in the patient's total rehabilitation, suggested reading, therapy for specific disturbances, and the value of

home programs. The length and intensity of the speech therapy program and its effect on the degree of improvement shown by the patient was another question brought up by the group.

Psychological Adjustment. The psychological aspects of the rehabilitation of the brain injured were more comprehensively discussed than any other aspect of the rehabilitation regime. The effect of family attitudes on the patient as the keynote of successful rehabilitation and readjustment was stressed. The adoption of cheerful, constructive, permissive attitudes was recommended. It was pointed out that criticism and forcing the patient to do things should be avoided at all costs since emotional problems inhibit motivation. Frustration results from the patient's difficulties in communication and his physical and possibly mental limitations. This is followed by anxiety and emotional upset which may in turn produce behavior problems.

There was considerable interchange of ideas among the group regarding spontaneous crying and the generally lowered emotional threshold of the patient. The need for creating a desirable emotional atmosphere at home was emphasized.

The staff members felt that the rehabilitation program should be geared to meet the patient's measured intellectual functioning. As a result of a discussion of this, the matter of vocations and avocations was brought up. Work tolerance and selective job placement were topics of discussion. In addition, the importance of dealing realistically with the patient in terms of his return to employment was talked over. The psychologist felt that suitable hobbies should be encouraged in the home setting provided that they were medically approved.

One aspect of rehabilitation that was emphasized throughout the series of discussions was the importance of socialization for the patient. Withdrawal from society following brain injury is a common finding; everything should be done, however, to provide friendly social situations for him and to encourage him to improve his interpersonal relationships.

The positive rather than the negative aspects of disability were brought out. On the other hand, oversolicitousness on the part of the family was discouraged. In other words, the participants were given a more or less realistic background upon which to assess the problems of the patient and their own role in rehabilitation.

Emotional Adjustment

The psychotherapeutic benefits from such a brief program were, of course, limited. Yet, in terms of adjusting the family to the patient, they can be of considerable value.

In the final analysis of the program the following factors appear to have therapeutic value:

(1) *Ventilation.* The process of talking about one's problems to a sympathetic, understanding audience and sharing one's burdens tends to reduce tension.

(2) *Reassurance.* This may take several forms. The fact that other participants face similar problems and handle them in a similar way is reassuring. The absence of destructive criticism on the part of participants and staff, and the acceptance or approval of ideas, attitudes and behavior has a similar effect.

(3) *Education and Orientation.* This has therapeutic value in that it reduces anxiety by removing doubts stemming from confusion, separates fact from fiction, and delineates the path to be followed.

(4) *Alleviation of Guilt.* This too may take several forms. One person may feel that the disability came about through personal neglect, another that it is a punishment for some real or imagined misdeed. Still others may feel that they have not done all they should to help the patient. In some cases the ideas may have some truth in them; very often they are false. Realization of the latter can come about through discussion and sharing of experiences; improvement can often be effected in the former through ventilation and acceptance by others.

(5) *Sharing Responsibility.* Turning to others for advice and being able to share one's own experiences tends to reduce the feeling of having to face things alone and to assume sole responsibility. This, in turn, can reduce anxiety.

(6) *Adopting a Constructive Outlook.* The concept of rehabilitation involves essentially an optimistic and forward-looking attitude. By emphasizing postive aspects, i.e., what the patient can do in terms of physical ability, education, vocation and socialization, the family is helped to accept emotionally the patient's disability.

Conclusions

Participants were asked for their reaction to the program. Written and verbal comments were uniformly favorable, reflecting a more optimistic outlook, improved morale, greater assurance in dealing with the patient, and less overt anxiety related to the problems encountered. The results are suggestive, not conclusive. The following evaluation is made with this in mind.

A group counseling program of the type described can help the families of aphasic patients adjust emotionally to the problems of the patient and handle them more objectively. Groups should be small and informal. Active participation of all members should be encouraged. Long lectures are not desirable, and no one individual should monopolize the discussion.

It is felt that such a program is of value as a psycho-therapeutic technique, and also as a means of orienting and educating the participants as to the nature of aphasia. It is likely that this type of program could be used with families of other aphasic groups. Finally, the approach should be kept flexible until there is opportunity for more research and evaluation.

A 'Medicine Bag' For The Speech Correctionist

Dorothy Bell

E. L. Pross

SOME OF THE simplest clinical problems may receive little critical attention because their solutions appear obvious. Thus, the teacher of methods and techniques in speech correction may carefully describe procedures to be followed and materials needed for implementation. He may assume that his students will assemble these materials in some systematic manner and will be prepared to accept cases when and if assigned. It has been the authors' experience, however, that such careful students are the exception, and, all too often, assignment to a case is followed by a frantic plea for correction materials. Sometimes a student correctionist may be unable to meet his cases and the substitute finds himself forced to make a hasty and often frenzied search for supplies. Occasionally, the student clinicians are invited to survey the voice and articulation cases of public schools lacking the services of a correctionist. The assortment of 'gear' that the uninitiated student clinician may assemble for such an expedition is often quite amazing.

As a class project materials were listed that would represent the basic essentials for the 'medicine bag' of the speech correctionist. These should supply all the 'tools' for the preliminary examination, provide minimum lesson materials for children of all ages, and include some supplies for working with adults. It was recognized that this basic kit would have to be supplemented in week-after-week meetings with any one child or adult. Twenty-two items were included in the kit.

The writers are fully aware that other correctionists may not completely agree on certain of the tests, materials, and procedures recommended and make no pretense of having attained the ultimate in a minimum-materials kit. In fact, it is hoped that the following recommendations will serve to arouse more interest in a basic practical problem.

1. Tests of mental maturity. Two copies of the California Short-Form Test of Mental Maturity, Pre-Primary; two copies each of the Otis Quick-Scoring Mental Ability Tests—Alpha Test, Beta Test, and Gamma Test. This battery enables the clinician to obtain, within the space of 20 or 30 minutes, a rough index of the I.Q. of cases from kindergarten to adult levels. These particular tests were selected because of the ease and speed of their administration and the simplicity of their scoring. The results are regarded as only an approximation of I.Q., and if more accurate scores are desired

Dorothy Bell (B.S., Texas, 1931) is director of the out-patient clinic, and E. L. Pross (Ph.D., Iowa, 1942) is Professor of Speech and Acting Chairman, Speech-Drama-Radio Department, Texas Christian University.

the child is sent to the psychological testing service. Possibly the greatest utility of these tests has been to detect children of border-line intelligence during the preliminary examination periods.

2. Two copies of the Minnesota Multiphasic Personality Inventory. This provides, in a single test, scores on all the more important phases of personality. It is of value for cases from about 16 years of age upward. Students administering and interpreting this test must have had considerable training in clinical psychology. The findings are of special assistance to the clinician working with stutterers and are frequently useful in certain types of voice problem cases.

3. One set of articulation test cards for non-readers. These consist of 40 or 50 6″ × 8″ heavy cardboard cards. On each is an attractive colored picture. At the bottom of the card is typed a question suggested by the picture. Following the phonetic order suggested by Fairbanks (*2*), the clinician tests articulation of 40 sounds. Since in running speech most sounds are medial, a response from the child is sought that will place the sound to be tested in this position. Some careful students add 10 or 12 additional cards in order to test in initial and final positions those sounds most frequently misarticulated by children.

4. Sentences for articulation examination of readers. To satisfy this need clinicians are required to include two copies of Fairbank's *Voice and Articulation Drillbook* (*2*) in the kit. This book offers 40 test sentences for primary readers and a similar test for adult readers. It also has material of considerable value in working with all adult voice and articulation cases.

5. Several copies of an articulation check sheet. This mimeographed sheet lists the speech sounds in the same order as does the tests and permits the clinician to indicate systematically whether the articulatory error is one of substitution, distortion, addition, omission, slighting, or voicing.

6. Two identical copies of *Reader's Digest*. The clinician making a voice check can thus have the pupil read material of about average difficulty and follow that reading closely. These magazines may also be used to considerable advantage in later clinical work and in almost all types of problems.

7. Several copies of a voice usage check sheet. This mimeographed sheet lists the more common errors under the headings of pitch, rate, loudness, quality, and complex attributes. This permits a systematic rating during conversation and reading performances.

8. A copy, mounted on cardboard, of an informal speech sound discrimination test. The clinician may suspect that there is a hearing loss and, if an audiometer is not readily available, he may wish to get some immediate evidence to support his belief. A simple test may be constructed by prefixing the high frequency sounds [s], [θ], [ʃ], [f] to the vowel [ɑ] in random pairs as: [sɑ]-[θɑ], [fɑ]-[fɑ], etc. About 24 such pairs will suffice for the test. The clinician then stands about 10 feet behind the child, and with average intensity pronounces each pair of sounds. The child then judges the pair as 'same' or 'different' sounds. If a considerable number of responses are in error an audiometer test is strongly recommended.

9. A copy, mounted on cardboard, of an auditory memory span test. The clinician may feel that a short memory span is related to the problem. A simple consonant test may be constructed by following the procedures suggested by West, Kennedy, and Carr (*4*).

10. Several wooden tongue depres-

sors. These are essential in making the oral examination.

11. A small pocket flashlight. Often the clinician must work under conditions of poor overhead lighting, and the flashlight is a most useful tool in making the oral examination in such situations.

12. A jar of stick candy. In working with young children clinicians have found this candy invaluable for determination of tongue activity, development of lip motility, and as a general motivation factor.

13. An adequate supply of paper and pencils. This is a manifest necessity but one easily overlooked.

14. A set of colored crayons. In working with young children these may be used in numerous ways in both therapy and motivation.

15. Two small mirrors. The steel, so-called trench mirror, has proved to be excellent for children's use. These permit the stutterer to observe his facial grimaces and serve many other clinical purposes.

16. Several copies of Johnson's 'An Open Letter to the Mother of a Stuttering Child' (*3*). We have found this understanding and practical analysis of the problem to be one of the best means of informing the parents of the young stutterer of their responsibility in the therapy.

17. A large candle and a package of matches. The possible uses of the candle flame are numerous. It may be used, for example, to test control of expiration, to develop breath control in cleft palate cases, and to check for breathy voice quality.

18. A small package of cleansing tissues. In addition to their obvious uses, these tissues may be used by the ingenious clinician in a multitude of ways: the cleft palate case may attempt to hold a piece of the tissue against the wall by expired air, the child may use it for crayon work, and it may be readily folded or cut to represent different animals or objects.

19. A small pair of scissors. In motivating small children the clinicians have discovered that elementary art work may be readily combined with speech therapy. The scissors are, therefore, most useful.

20. Story-pictures. All of our students are required to develop 8″ × 10″ picture cards, each representing one of the 12 sounds most frequently misarticulated by children. The picture that most adequately represents each sound is left to the imagination of the clinicians. To one, for instance, the [r] may suggest the growl of a bull-dog. On his picture card, therefore, will appear the picture of a bull-dog, either cut from a magazine or hand-drawn and colored. He then develops a story, and the [r] plays an important role therein. Thus, in teaching a child a new sound, the clinician can stimulate both auditorily and visually. The story is typed and attached to the back of the picture-card. Most students are soon able to tell the story, with elaborations suitable to the age and interest of the child, without the aid of the printed version.

21. Several copies of a summary case history form. Unless the student clinician has a definite and familiar form to follow, particularly during the preliminary examination period, he may overlook certain procedures or neglect to obtain complete data. The exact form of the case history will depend upon many factors, but we have found that with slight modifications the one suggested by Ainsworth (*1*) is most practical for our purposes.

22. Several copies of a stuttering case history. We believe it neither practical nor desirable to use the same case history for stutterers as for other

cases. Instead, we have developed one based upon the suggestions of Wendell Johnson with the following headings:

I. Problem as of now
   A. Alterable features of speech
      1. Overt
      2. Covert
   B. Alterable features of social activity
   C. Alterable features of daily routine
   D. Alterable features of plans
   E. Alterable features of physical condition
   F. Alterable features of environment
   G. Alterable features of evaluation behavior
II. Relatable Data
   A. Family Background
   B. Birth and general development
   C. Speech development
   D. Experience record
   E. Person's own evaluation of above material
III. Plan of Retraining
   A. Specific alterations—in what order —by what procedures
IV. Prognosis
   A. What alterations—how soon

Such is the kit that our clinicians have evolved. Most of them place their collection in a large compartmented manila folder which has limited life but is relatively inexpensive and easy to replace. The writers would be most interested in learning how other clinics have met this problem of the 'medicine bag.' There is always room for one more 'essential' item.

References

1. Ainsworth, *S. Speech Correction Methods.* New York: Prentice-Hall, 1948.
2. Fairbanks, G. *Voice and Articulation Drillbook.* New York: Harper, 1940.
3. Johnson, W. An open letter to the mother of a stuttering child. *JSHD,* 14, 1949, 3-8. (Copies available from The Interstate Printers and Publishers, Inc., Danville, Ill.)
4. West, R., Kennedy, L. and Carr, A. *The Rehabilitation of Speech.* (Rev. ed.) New York: Harper, 1947.

The Influence Of Certain Vowel Types On Degree Of Harsh Voice Quality

Dorothy Sherman

Eugene Linke

THE WRITERS of textbooks concerned with speech correction differ with respect to the classification of disorders of voice quality. The number of categories and the particular descriptive names by which they are identified vary from text to text. Also, the divergence of definitions and descriptions preclude the possibility of any final classification on the basis of existing information. Certain disorders of voice quality, however, do seem to be fairly well identified and established as clinical entities. The present study is concerned with one of these, the voice disorder called harshness.

A survey of nine textbooks on speech and speech correction (*1, 2, 4, 5, 6, 9, 10, 13, 14*) establishes the fact that a category called harshness is usually included in classifications of voice disorders and that there is fair agreement among the authors of these texts in describing the disorder. Eight of them refer to or describe a voice disorder called harshness. One author (*5*) refers to 'raucous voice quality,' describing the disorder in terms similar to those used by others in describing harsh voice quality. Representative of the descriptions which, in general, are quite similar to one another, is the one which follows: 'Harsh voice quality has an unpleasant, rough, rasping sound' (*6*).

The hypothesis that a voice disorder ordinarily identified as harshness exists as a clinical entity seems reasonable. For the purposes of this study it was assumed that persons with some training in voice disorders could recognize harsh voice quality and that judgments of the severity of the disorder would result in reliable scale values.

Further survey of the above mentioned nine textbooks does not disclose close agreement with reference to possible etiological factors. One writer (*9*) states that harsh voice quality is the result of a personality fault and should be treated as such; one (*13*) states that the disorder may be accompanied by false vocal cord vibration; another (*4*) lists laryngeal pathology as one of the possible causes. Commonly described causes are laryngeal tension (*4, 5, 6, 13*) and 'faulty' resonance, resulting from throat tension or constriction (*1, 2, 5, 6, 10, 13, 14*).

With respect to therapeutic techniques eight of the nine authors (*1, 2, 4, 5, 6, 10, 13, 14*) propose that relaxation procedures should be used to attain voice production accompanied by less pharyngeal and laryngeal tension. Three advocate a change of habitual

Dorothy Sherman (Ph.D., Iowa, 1951) is Assistant Professor of Speech Pathology and Audiology, and Eugene Linke (M.A., Iowa, 1952) is a graduate teaching assistant in Speech Pathology and Audiology, State University of Iowa.

pitch level. One (*13*) of these three specifically advocates raising the pitch level, while two (*4, 6*) advocate the attainment of an adequate pitch level.

Fairbanks (*4*) proposes the gradual initiation of vocal tone as a means of achieving better voice quality. He also implies by a suggested drill exercise that certain vowels may, in general, be perceived as being less harsh than others. The material for the suggested drill consists of a series of pairs of sentences. In the first sentence of each pair the vowels are preponderantly the front vowels [ɛ] and [æ]. The second of each pair contains a greater proportion of the back vowels [u], [ʊ], [o], and [ɔ]. The instructions for reading state that the first sentence of each pair should be made harsh and that the second sentence should be made non-harsh. A possible inference is that front vowels facilitate harshness while back vowels facilitate non-harshness.

Pronovost (*8*) suggests another therapeutic technique:

> Such functional defects of tonal initiation as harshness and gutteral quality often require adjustment of the duration of the laryngeal tone and the rate of utterance. Usually the duration of tone is too short to allow for effective resonance . . . .

This suggests that the length of vowels may be a factor in the degree of harshness perceived, that short vowels are perceived as being more harsh than long vowels.

Although certain assumptions are apparently inherent in the rationale for therapeutic procedures, the experimental data on which to base such assumptions are meager. The writers were unable to discover any report in the literature of systematic investigation to test the assumptions that vowel quality and vowel length are functionally related to the degree of perceived harshness of voice quality.

The purpose of this study was to test these assumptions experimentally. The basic problem was to determine whether there is variation in the degree of perceived harshness concomitant with changes in the types of vowels used in speech. A specific purpose was to obtain evidence which would provide a basis for the evaluation of the clinical techniques in question.

The experimental procedure included the following steps: (1) Passages were constructed in which the vowel content was controlled and categorized; (2) adult males who had been judged to have harsh voice quality were chosen as subjects; (3) all passages were recorded for each subject; (4) the recorded speech samples were presented to a group of trained observers who judged degree of severity of harsh voice quality for each passage for each voice; (5) the obtained judgments were used to compute a median scale value of severity for each sample; (6) an analysis of variance technique was employed with the resultant scale values to determine whether there are real differences in degree of perceived harshness which are functionally related to the vowel types chosen for study.

Equipment

A high fidelity tape recorder, Presto, Model RC 10/24, was used for recording the speech samples. The tapes were recorded at a speed of 15 inches per second. The recording microphone was an Electro Voice, Model 650.

The instrumentation for the listening sessions consisted of: (1) the Presto RC 10/24 tape playback; (2) a T-pad, 500-ohm input, 600-ohm output; (3) a McIntosh amplifier, Model

20W2; and (4) a Permoflux 15-inch Coronet loudspeaker.

The recording microphone and the loudspeaker were located in a sound-isolated room. All other equipment was in an adjacent room.

Procedure

Selection of Vowel Categories. Certain clinical techniques, as already indicated in previous discussion, seem to be based on the assumptions that short vowels or front vowels facilitate a voice quality perceived as harsh and that long vowels or back vowels facilitate a voice quality perceived as non-harsh.

A three-fold classification proposed by Thomas (*11*) includes the categories of front and back vowels. According to the system any vowel can be described by taking into account: (1) the height of the tongue, that is, high, mid, or low; (2) the place at which this high point occurs, that is, at the front, center, or back of the tongue; and (3) the relative tenseness of the muscles of the tongue and of the surrounding articulatory mechanism, that is, tense or lax. To describe a given vowel, the appropriate term relevant to each of these three considerations is used. For example, the vowel [i] is a high, front, tense vowel.

According to measurements of duration of vowels reported by Black (*3*), the high and low vowels, as classified by Thomas, correspond roughly to a short and long vowel classification. Black used two techniques for measuring duration of the vowel, one employing a graphic level recorder and one employing magnetic tape recordings. Measurements obtained by the first method indicate exact correspondence of the categories high and low with shorter and longer. By the second method of measurement, there is one low vowel, [ɑ], slightly shorter in duration than one high vowel, [u]. The difference in duration between these two vowels, however, is not statistically significant by either method of measurement. All other differences in duration between high and low vowels are significant at the one per cent level of confidence. That a difference in perception between high and low vowels might be related to the duration factor seems reasonable.

In accordance with the above considerations six classes of vowels were selected for study: front, back, high (or short), low (or long), tense, and lax.

Construction of Speech Samples. To provide the test stimuli, six passages of connected reading material were constructed. Each passage contained approximately 82 vowels, which included 63 to 65 vowels from one of the six categories plus 12 [ə]'s or [ʌ]'s, five [ɚ]'s or [ɝ]'s, and one [aʊ]. The additional sounds constant for all passages were included to make possible the construction of meaningful connected reading material. Each passage was approximately 30 seconds in length. The frequency of occurrence of each vowel for each of the six passages was as follows:

Passage 1. front vowels: [i]-16, [ɪ]-12, [e]-16, [ɛ]-11, [æ]-10

Passage 2. back vowels: [u]-14, [ʊ]-17, [o]-6, [ɔ]-12, [ɑ]-17

Passage 3. high (or short) vowels: [i]-16, [u]-16, [ɪ]-16, [ʊ]-16

Passage 4. low (or long) vowels: [æ]-24, [ɔ]-24, [ɑ]-16

Passage 5. tense vowels: [i]-17, [u]-5, [e]-17, [o]-6, [ɔ]-20

Passage 6. lax vowels: [ɪ]-13, [ʊ]-6, [ɛ]-13, [æ]-15, [ɑ]-16

Pronovost (*8*), in accordance with the hypothesis that duration of the

laryngeal tone may be too short to allow for effective resonance, recommends devising drill material containing as few voiceless consonants as possible. To equalize the possible differential operation of such a factor from sample to sample, the proportion of voiced and voiceless consonants was held relatively constant for all passages.

Preparation of Recorded Test Tapes. The experimental subjects were 15 male university students, each of whom, according to clinical diagnosis, exhibited harsh voice quality. The final criterion by which these 15 voices were selected was agreement among six judges who independently diagnosed the voice disorder present. The judges were all graduate students in speech pathology.

Phonetic transcriptions of the recorded passages were made for the purpose of determining whether the phonetic content was essentially the same from subject to subject for any one passage. The phonetic content of any passage will vary somewhat from reader to reader, depending upon such factors as reading rate, reading ability, inidividual speech habits, and phonetic background. No subject deviated from experimental requirements to any significant extent.

The recording microphone was located in the sound-isolated room with the experimenter operating the tape recorder in the adjacent room. Before recording, each subject was given time to become familiar with the passages by reading them aloud. To eliminate the possibility of a systematic effect of order on degree of severity of harshness, the reading order of the six passages was randomized for each subject.

The 90 speech samples to be scaled, six samples for each of 15 subjects, were assigned a random order by the use of a table of random numbers. One restriction was placed on the randomization. No two samples for any one subject were placed immediately adjacent to each other. This precaution was taken for the purpose of aiding the observers to make independent judgments. The resultant scale values of severity were to be the criterion measures employed in an analysis of variance, making necessary the assumption of independence of the judgments. The tape recordings of the speech samples were assembled in the predetermined random order to make three tapes of 30 samples each.

Judging the Samples. By means of tape playback the speech samples were presented to 35 observers. They were seniors or graduate students in speech pathology, all of whom had had some training in diagnosis of speech disorders and none of whom was familiar with the purposes or nature of the study. They listened binaurally in the sound-isolated room under essentially free field conditions.

Presented first were tape recorded readings of a short passage[1] by each of four voices, two of which were representative of most severe harsh voice quality and two of which were representative of least severe harsh voice quality. These recorded readings were presented several times as requested by the observers until each felt reasonably certain he could identify the extremes of the scale.

The 90 samples, arranged in random order, and assembled as Tapes 1, 2, and 3 with 30 samples each, were presented for listener judgments on a seven-point equal-appearing intervals scale. Tape 1 was also presented as

[1] The passage read was the first paragraph from 'The Rainbow Passage' (*4*, p. 168).

Tape 4. The listeners were not informed that Tapes 1 and 4 were the same. They were not informed that judgments on Tape 1 were made for the purpose of minimizing learning or practice effects.

Each observer completed the judging task in a single experimental listening session of approximately one hour and forty-five minutes, which included the time for instructions, for the training and practice period, and for a short rest period. There were four experimental listening sessions in all.

Results and Discussion

Scale Values. The 90 speech samples were scaled through an application of the method of equal appearing intervals employing a seven-point scale extending from *one*, for least severe harshness, to *seven*, for most severe harshness. Median scale values and *Q*-values were obtained for the samples from the judgmental responses of 35 listeners in the way described by Thurstone and Chave (*12*).

Whether the speech samples were precisely scaled is a question importantly related to the usefulness of the resultant scale values as criterion measures in the statistical analysis employed to evaluate the hypotheses the study was designed to investigate. In general, the *Q*-values, which measure the dispersion of judgments, were satisfactorily small, indicating fairly reliable measures of degree of severity of harshness. The range was from .32 to 1.24, with a mean of .77 and a standard deviation of .18.

Further evidence that the method would yield the same results on successive applications was obtained by the correlation of scale values derived from the listener responses of the first two experimental judging sessions with scale values derived from the listener responses of the last two experimental judging sessions.

Pearson's correlation procedure was employed along with a test of the difference between the means of the two sets of scale values with the following results:

Mean	*Diff.*	SE_D	t^2	r
3.39				
3.81	.42	.22	1.91	.97

The mean difference of .42 is fairly small and not quite large enough to be significant at the five per cent level of confidence. Thus, the obtained Pearson r of .97 is good evidence that the obtained scale values are satisfactorily precise for the purposes of this study.

Differences among Reading Passages. The basic problem was to determine whether degree of perceived harshness is functionally related to vowel types categorized as indicated previously. Thus, the necessary statistical procedure was to test for significant differences among the means based on the scale values of the 15 voice samples for each reading passage. For this purpose an analysis of variance technique was employed. The statistical design is the one Lindquist (7) classifies as a treatments × subjects design. In this case the design is passages (P) × voices (V).

Results of the analysis of variance are presented in Table 1. That the degree of perceived harshness is related to vowel type is indicated by the significant result of the *F*-test.[3]

Differences between the two mean scale values for all possible pairs of passages are summarized in Table 2. The critical difference, that is, the difference required for significance at

[2] $t_{.05}$ $(df = 90) = 1.987$

[3] The level of significance selected for all tests in this study was five per cent.

TABLE 1. Summary of analysis of variance, testing differences among mean scale values obtained for six passages read by 15 harsh voices and judged by a group of trained observers.

Source of Variation	*df*	*ss*	*ms*	*F*
Passages (P)	5	7.82	1.564	12.41*
Voices (V)	14	183.59	13.113	
P × V	70	8.84	.126	
Total	89	200.25		

*$F = ms_P / ms_{P \times V}$. *F*, 5 and 70, 5 per cent level of confidence, 4.36.

the five per cent level, is .26.[4] Only four of the 15 differences are non-significant.

No real difference was demonstrated between the mean scale values for the passages for front and back vowels. This does not disprove the usefulness of the clinical technique which suggested this particular comparison, however, since the vowel content of the passages employed in this study differs considerably from that of the recommended drill sentences.

The difference between mean scale values obtained for the comparison of high or short vowels with low or long vowels is significant. This difference is opposite in direction to that predicted on the assumption that short vowels are perceptually more harsh than long vowels. The statement cannot be made that the obtained difference is to be explained by reference to the length factor as such. Other characteristics of the particular vowels employed in constructing the passages may be responsible for the difference. That the original assumption under test is false, however, seems certain. The longer vowels, in general, are not perceived as less harsh than shorter vowels. The original assumption might still be true as applied to changes in length for any single vowel.

The passage containing tense vowels was judged to be more harsh than the passage containing lax vowels. The obtained difference between mean scale values is significant. A commonly reported cause of harsh voice quality is laryngeal tension. The possible explanation that relative tenseness of the tongue and of the surrounding articulatory mechanism is functionally related to the relative tension in the larynx seems reasonable.

TABLE 2. Differences among obtained mean scale values for six passages read by 15 harsh voices and judged by a group of trained observers.

*Passage**	*2*	*3*	*4*	*5*	*6*	*Mean Scale Value*
1	.21	.10	.56†	.74†	.29†	3.30
2		.31†	.35†	.53†	.08	3.51
3			.66†	.84†	.39†	3.20
4				.18	.27†	3.86
5					.45†	4.04
Mean Scale Value	3.51	3.20	3.86	4.04	3.59	

* Passages are identified as follows: 1, front vowels; 2, back vowels; 3, high (or short) vowels; 4, low (or long) vowels; 5, tense vowels; 6, lax vowels. The entry in each cell corresponding to two passages is the difference between the mean scale values for the passages indicated in the margins of the table.

† Significant at the five per cent level of confidence. The required difference at this level is .26.

[4] The critical difference was computed by the formula:

$$\text{critical difference} = t_{.05}\,(2ms_{PV}/v)^{1/2},$$

where: ms_{PV} = interaction mean square for passages × voices
v = number of voices
df = number of voices minus 1 multiplied by number of passages minus 1

Other differences than the particular ones the study was designed to investigate appear to be important. Of the possible 15 intercomparisons 11 are significant. For example, Passage 2, containing back vowels, was judged to be significantly less harsh than Passage 4, containing low or long vowels. The vowels [ɔ] and [ɑ] are common to both passages, although not in the same proportion. Whether the obtained significant difference is entirely owing to the presence of [æ] in the low or long vowel passage as compared with [u], [ʊ], and [o] in the back vowel passage is a question which cannot be answered satisfactorily under the experimental design employed. Similar comparisons can be made for other significant differences, but useful interpretation of the differences is not feasible. Further study employing an experimental design to allow for intercomparisons among individual vowels should provide meaningful clues for determining what factors operate to cause certain vowels to be perceived as more harsh than others. That there are other factors than those presently investigated is apparent. Information on individual vowels would be clinically useful for the purpose of building drill exercises. Probably more important, however, would be the implications for further research to establish the exact nature of the phenomenon of harsh voice quality. The writers found no data reported in the literature to indicate the nature of the differences between harsh and non-harsh voice quality in physical pattern. Knowledge of the exact nature of the dependence of degree of perceived harshness upon variation of vowel quality should provide useful information for planning research both (1) for the purpose of examining the distinctive characteristics of the physical pattern of harsh voice quality, and (2) for the purpose of determining the physiological etiology of the disorder.

Summary

The main purpose of the present study was to determine whether variation of vowel content in speech has any effect on degree of perceived harsh voice quality.

The particular vowel categories chosen for study were as follows: front, back, high (or short), low (or long), tense, and lax.

Fifteen adult male subjects whose voices had been judged to exhibit harsh voice quality were employed to record six reading passages on magnetic tape. The vowel content of each passage was controlled and belonged predominantly to one of the vowel categories selected for study.

By means of tape playback the speech samples were judged on a seven-point scale by a group of 35 observers. Resultant median scale values provided the criterion measures employed in an analysis of variance with a passages × voices statistical design for testing the significance of differences among mean scale values of severity obtained for the six passages.

In accordance with the experimental findings, the following statements seem warranted:

1. High vowels are perceived as less harsh than low vowels. Since high vowels are shorter in duration than low vowels, the assumption that short vowels are, in general, perceived as less harsh than long vowels seems reasonable. Further experimentation, however, with a more complete classification of vowels according to their duration is needed.

2. Lax vowels are perceived as less harsh than tense vowels.

3. Factors important in vowel classification other than those related to the particular categories of vowels investigated in this study have an important effect on perceived degree of severity of harsh voice quality.

References

1. Anderson, V. A. *Training the Speaking Voice.* New York: Oxford Univ. Press, 1942.
2. Bender, J. F. and Kleinfeld, V. M. *Principles and Practices of Speech Correction.* Chicago: Pitman, 1938.
3. Black, J. F. Natural frequency, duration, and intensity of vowels in reading. *JSHD,* 14, 1949, 216-221.
4. Fairbanks, G. *Voice and Articulation Drillbook.* New York: Harper, 1940.
5. Holmes, F. L. D. *A Handbook of Voice Improvement.* Mimeographed. Madison: College Typing Company, 1935.
6. Johnson, W., Brown, S. F., Curtis, J. F., Edney, C. W., Keaster, J. *Speech Handicapped School Children.* New York: Harper, 1948.
7. Lindquist, E. F. Design and analysis of experiments in psychology and education. Unpublished manuscript, 1952.
8. Pronovost, W. Research contributions to voice improvement. *JSD,* 7, 1942, 313-318.
9. Raubicheck, L., Davis, E., and Carll, A. *Voice and Speech Problems.* New York: Prentice-Hall, 1931.
10. Russell, G. O. *Speech and Voice.* New York: Macmillan, 1931.
11. Thomas, C. K. *An Introduction to the Phonetics of American English.* New York: Ronald Press, 1947.
12. Thurstone, L. L. and Chave, E. J. *The Measurement of Attitude.* Chicago: Univ. of Chicago Press, 1929.
13. Van Riper, C. *Speech Correction Principles and Methods.* (2nd Ed.) New York: Prentice-Hall, 1947.
14. West, R., Kennedy, L. and Carr, A. *The Rehabilitation of Speech.* (Rev. Ed.) New York: Harper, 1947.

Accompaniments Of Word Intelligibility

John W. Black

SOME SPOKEN WORDS are more readily identified than others, a fact that has applications in a variety of circumstances. The context of intelligibility (articulation) testing in which this report is prepared is an example of the circumstances in which differential word-recognition values are important.

Intelligibility testing requires equivalent tests that are alike in mean difficulty and in distributions of the scores of the items. These scores are derived from recognition or identification values of the items by listeners. Typically, the balancing of phonetic elements from test to test is assumed to be important. Aside from the face validity of this practice there is the relevant fact that successive investigations in the Bell Telephone Laboratories (*8, 9*) led to a formula for predicting the intelligibility of a syllable from the articulation scores of the component phonemes.

The principal intelligibility tests that were developed in the Psycho-Acoustic Laboratory (*5*) included sounds in each list in approximately the same proportion that Dewey (*4*) had found them to occur in English—mostly written English.

John W. Black (Ph.D., Iowa, 1935) is Professor of Speech and Director of Speech Science at the Ohio State University. This article is adapted from a paper presented at the 1951 Convention of ASHA, Chicago, Ill. This study was conducted at the U. S. Naval School of Aviation Medicine, N.A.S., Pensacola, Fla., under a contract between the Office of Naval Research and the Ohio State University Research Foundation.

Analysis of the little-publicized Jones test of enunciation (*12*) shows that she attempted to employ the same sounds from one test-list to another.

Possibly Haagen (*10, 11*) is the first worker in intelligibility testing largely to ignore the phonetic content of a word or test-list, relying only on per cent recognition of each item in constructing equated test-lists.

Mason (*15*), in an effort to establish a formula for predicting the intelligibility value of a word, re-studied the answer sheets from which Haagen derived per cent intelligibility values of words. He found three characteristics of word structure and phonetic content that were related to correct identification of words: (a) more than one syllable, (b) a diphthong or [i], (c) absence of the sounds [s], [f], and [θ].

The present study is confined to relationships between aspects of the syllabic pattern, word familiarity, and phonetic characteristics of words and the relative intelligibility of the words; thus, an extension of Mason's work is involved. The investigation was based on a sample of 3697 words of medium intelligibility.

Procedure

The experimental list of words was drawn from Thorndike's categories 1a-10 (*17*). First, the 10,000 words were screened to remove proper names, homonyms, and homographs. Second, the remaining words were screened to remove words of the high-

est and lowest intelligibility. Three voices read the words to panels of listeners in classroom 'quiet' (65 db of white noise, General Radio sound level meter, Scale C) with the talker 20 feet from the listeners; also to panels of listeners over an airplane intercommunication system in high-level (108-110db) simulated airplane 'noise.' Only words that were 20-80% intelligible in these preliminary tests in both quiet and noise were retained. The remaining population of 3697 words was recorded by 10 speakers on 16-inch discs in lists of 150 words and played back to panels of 9-12 listeners. The listeners were naval personnel who were in an early stage of the pilot training program. Typically they had two years of college training. A single panel usually heard three lists or 450 items. Thus approximately 80 panels heard the words as write-down tests in quiet and another 80 panels, in noise. The levels at which the recordings were played back were the same from one panel to another. The level of the signal in the noise condition was an average level of reception of voice over an airplane intercommunication system; the level of the signal in the quiet condition was 2 db above a white noise background of 65 db. Relative word-intelligibility values were re-computed on the basis of these presentations of the words and these scores were employed in subsequent statistical analyses.

The following information about each word was encoded on IBM cards: serial number of the word in an alphabetized ordering of the items, spelling, phonetic content,[1] number of syllables, number of sounds, number of the accented syllable, Thorndike rating of the word, and intelligibility scores in quiet and in noise.

The following relationships were tested with the indicated statistics:

a. Relationship between the intelligibility scores of words when heard in quiet and noise. r

b. Comparison of the intelligibility scores of words representing Thorndike categories 1-10. F

c. Comparison of the intelligibility scores of words of 2-8 sounds. F

d. Comparison of the intelligibility scores of one- and two-syllable words. t

e. Comparison of the intelligibility scores of words with first- and second-syllable accents. t

f. Independence of the number of sounds (2-8) in words and their Thorndike ratings (1-10). χ^2

g. Independence of the number of syllables (1-2) in words and their Thorndike ratings (1-10). χ^2

h. Comparisons of the intelligibility scores of words containing a phoneme and words not containing the same sound (49 instances). t

i. Comparison of the intelligibility scores of words beginning with a selected sound and words not beginning with that sound (36 instances); also beginning and not beginning with selected letters. t

j. Comparison of the intelligibility values of words containing a voiced sound and words containing the voiceless counterpart of that sound, as [p] [b]. t

k. Comparison of the intelligibility values of two-sound words of VC order and similar words of CV order. t

l. Comparison of the intelligibility values of one-syllable, three-sound words, of CCV, VCV, and VCC composition. F

m. Comparison of the intelligibility values of two-syllable words containing variations of [r], specifically [r], [ɚ] and [ɝ]. F

n. Comparison of the intelligibility values of one-syllable words containing inherently long vowels and similiar words containing inherently short vowels. t

o. Comparison of the intelligibility values of one-syllable words containing vowels of inherently 'greater' sound level and ones of inherently 'lesser' level. t

[1]The phonetic transcription following general American pronunciation was determined by two students of phonetics who hold M.A. degrees in speech. One had taught phonetics. One made the transcriptions and the other checked them. Finally the transcription was compared with the spellings of Kenyon and Knott (*13*).

TABLE 1. Summary of analysis of variance of the intelligibility scores of words of 15 Thorndike ratings 1a-10.

Source of Variation	*d f*	*Variance*	*F*
Ratings	14	3417.73	11.62
Remainder	3682	294.08	
Total	3696		

The statistical tests were applied to relevant null hypotheses; for example, There is no relationship between intelligibility scores of recorded words when spoken and heard in noise *vs.* when spoken and heard in quiet.

Results

Intelligibility Scores in Quiet vs. Noise. The product-moment correlation coefficient between the intelligibility scores of the recorded words when heard in quiet and in noise was .70. The calculation was based on a sample of 369 words, every tenth card in the population. This correlation, statistically highly significant (1%), indicates that half of the variance of one set of values (noise) is to be accounted for by the variance of the other set of values (quiet). The interpretation of this relationship was important in the application of the remaining 14 tests. To consider it a *high* correlation might justify applying the tests to one set of values with the implication that the results might be applied directly to the other. To consider it a *low* correlation would mean that the remaining 14 tests should be applied to the quiet scores and again to the noise scores of the words. The decision to apply the remaining tests to one set of values—the noise scores—*for the present*, was based on an assumption that as a single source of prediction of word intelligibility, a correlation coefficient of .70 was relatively high.[2] By way of comparison, the same items may correlate no more than .86—accounting for two-thirds of the variance—when employed in noise in different military training centers (*11*).

The mean percentages and standard deviations of the two distributions were: quiet, 50.9 ± 18.5; noise, 64.6 ± 13.7.

Intelligibility Scores and Thorndike Ratings of Words. Word intelligibility scores were not independent of the Thorndike ratings of the words (*F*, 11.62; 14 and 3682 *d f*). The relevant analysis of variance is summarized in Table 1 and the means of the intelli-

[2]This assumption has proved practical. Two forms of an intelligibility test of 12 lists each were devised on the basis of noise scores. Lists were alike in mean level of difficulty and variance of item scores in noise. The tests were then administered in quiet as well as in noise. On the basis of an analysis of the results of the trials in quiet, there was no reason to reject an hypothesis of 'no dissimilarity' among the lists.

TABLE 2. Mean relative intelligibility scores of words (in noise) corresponding to Thorndike ratings of words.

	*Thorndike Rating**									
	1	2	3	4	5	6	7	8	9	10
Mean Intelligibility†	66.9	66.0	65.5	64.3	64.4	62.5	61.8	63.5	59.4	59.5
N, Words	513	486	445	420	386	353	304	283	255	252

*Sub-divisions 1a - 1b . . . 5a - 5b are grouped 1 - 5.

†Any difference between two means of 3.20 (approximately), significant (*t*) 1%; 2.44, 5%.

TABLE 3. Summary of analyses of variance of the intelligibility scores of words catagorized according to numbers of sounds.

Source of Variation	*d f*	*Variance*	*F*
a. One-syllable words			
Number of Sounds	4	1661.8	4.98
Remainder	1544	333.6	
Total	1548		
b. Two-syllable words			
Number of Sounds	5	3063.4	13.36
Remainder	2143	229.4	
Total	2148		

gibility scores associated with the Thorndike classifications of the words are shown in Table 2. Words in categories 1-5 were significantly more intelligible than the remaining words; and words in categories 9-10 were significantly less intelligible than all other groupings. Ausherman (*1*) has shown that more words with a Thorndike rating *1* than with a rating *2* occur in the classroom speeches of college-age students; more *2* than *3;* etc. This suggests that the Thorndike ratings are related to the listeners' familiarity with words, and under this assumption the present results further indicate that relative intelligibility values of words are probably in part attributable to listeners' familiarity with the words, even in the instances of relatively common words.

One-Syllable and Two-Syllable Words. The sample included 1551 words of one syllable and 2151 of two syllables. The mean intelligibility values and the standard deviations of these groups were 57.7 ± 17.8 and 68.3 ± 15.8 respectively. This difference is significant beyond the one per cent level of confidence (*t*, 15.7).

Number of Sounds per Word. The one-syllable words contained 1-7 phonemes and the two-syllable words, 3-9. Intelligibility values varied with the number of sounds in both one- and two-syllable words, generally increasing with a larger number of sounds. Analyses of variance of the one-syllable words, sorted by number of sounds, yielded *F*, 4.98 (4 and 1544 *d f*); and for two-syllable words, *F*, 13.36 (5 and 2143 *d f*). These analyses are summarized in Table 3. The mean intelligibility values of words of different numbers of sounds are enumerated in Table 4. The mean increment in intelligibility per sound in Table 4 (excluding the small sample of six-sound, one-syllable words) is 2-3%, approximately one-half of the mean increment in intelligibility that can be attributed to a second syllable. The following pairs of adjacent mean values in the two rows of Table 4 are significantly different: Row 1, sounds 3-4 (*t*, 2.2), sounds 4-5 (*t*, 2.8); Row 2, sounds 4-5 (*t*, 3.0). The pairs of means in columns *3*, *4*, *5*, and *6 sounds* differ significantly (*t*, 3.13, 9.32, 3.06, and 2.06 respectively with degrees of freedom, $N_1 + N_2 - 2$).

TABLE 4. Mean intelligibility scores of words containing various numbers of sounds.

	Number of Sounds								
	1	*2*	*3*	*4*	*5*	*6*	*7*	*8*	*9*
One-syllable	..	54.9	56.2	58.3	63.0	67.7	..		
N	1	92	679	628	143	7	1		
Two-syllable			63.4	66.5	68.9	69.1	70.7	74.2	..
N			47	528	765	555	196	58	2

TABLE 5. Contingency table enumerating observed and theoretical frequencies (in parentheses) of words of 2-8 sounds and Thorndike ratings 1a-10 in a population of 3683 words. Chi-square=531.4 (df=56).

	Thorndike Rating																
	1a	*1b*	*2a*	*2b*	*3a*	*3b*	*4a*	*4b*	*5a*	*5b*	*6*	*7*	*8*	*9*	*10*	Σ	
2	35 (6.7)	11 (6.1)	9 (6.0)	6 (6.1)	5 (5.5)	4 (5.6)	4 (5.2)	3 (5.3)	0 (5.3)	2 (4.3)	8 (8.9)	2 (7.4)	1 (7.1)	2 (6.3)	1 (6.3)	93	(2.5%)
3	117 (52.5)	92 (47.6)	65 (47.0)	68 (47.6)	50 (42.5)	39 (43.9)	41 (40.8)	38 (41.0)	46 (41.1)	18 (33.3)	42 (69.0)	30 (57.9)	25 (55.4)	27 (49.3)	21 (49.3)	719	(19.5%)
4	83 (84.5)	82 (76.6)	96 (75.7)	91 (76.6)	72 (68.5)	77 (70.7)	65 (65.6)	64 (65.9)	63 (66.3)	63 (53.7)	101 (111.2)	83 (93.3)	82 (89.2)	68 (79.4)	65 (79.4)	1155	(31.4%)
5	21 (65.9)	41 (59.8)	43 (59.0)	46 (59.8)	59 (53.4)	63 (55.1)	56 (51.2)	60 (51.5)	48 (51.7)	48 (41.9)	98 (86.7)	87 (72.8)	84 (69.6)	65 (64.0)	84 (64.0)	903	(24.5%)
6	7 (40.9)	14 (37.1)	23 (36.6)	21 (37.1)	25 (33.1)	35 (34.2)	27 (31.8)	35 (31.9)	41 (32.1)	23 (30.0)	78 (53.8)	62 (45.1)	58 (43.2)	60 (38.5)	52 (38.5)	561	(15.2%)
7	5 (14.3)	2 (12.9)	4 (12.7)	10 (12.9)	6 (11.6)	5 (11.9)	12 (11.1)	9 (11.1)	11 (11.2)	13 (9.1)	21 (18.7)	20 (15.7)	28 (15.1)	24 (13.4)	24 (13.4)	194	(5.3%)
8	1 (4.3)	2 (3.9)	1 (3.9)	2 (3.9)	1 (3.5)	2 (3.6)	4 (3.3)	1 (3.4)	2 (3.4)	4 (2.7)	6 (5.7)	13 (4.8)	6 (4.5)	7 (4.0)	6 (4.0)	58	(1.6%)
N	269	244	241	244	218	225	209	210	211	171	354	297	284	253	253	3683*	(100%)

*Σf_t =3691.2 due to discrepancies in rounding.

Word Frequency Related to Word Length. The preceding paragraphs treat intelligibility with respect to word familiarity and length. Two additional tests were made relative to the familiarity and phonetic complexity of the words. In the first, chi-square was determined for a matrix that enumerated the number of sounds in words that were classified according to their Thorndike ratings. The data are presented in Table 5. The theoretical frequency in each cell is indicated in parentheses. Because of the small numbers of entries in the cells in the first and last rows, these rows were combined with the adjacent ones in the calculations. Thus the computation was

$$\chi^2 = \frac{(152-59.2)^2}{59.2} + \frac{(103-53.7)^2}{53.7} + \ldots + \frac{(31-17.4)^2}{17.4} + \frac{(30-17.4)^2}{17.4} = 531.4.$$

The total chi-square, 531.4 (56 *df*), was highly significant indicating that a hypothesis of independence between the two classifications should be rejected. The chi-square value for each row is also highly significant (1%) except in the instance of words of four sounds (5%).[3]

A test similar to the preceding one is summarized in Table 6 with number of syllables and Thorndike rating of the words tested for independence. Chi-square was significant, 472.0 (14 *df*). Inspection of the two tables

[3] The observed and theoretical frequencies of words of various numbers of sounds are enumerated in the rows, Table 5, classified according to 15 Thorndike ratings. Each row may be viewed as *occurrence* and together with *non-occurrence* (the pooled values of the other values in the columns) be tested for significance with 14 *df*. The five *row* values of chi-square in the present instance are: 351.3 (two- and three-sound words pooled), 26.6, 83.6, 121.0, and 526.9 (seven- and eight-sound words pooled).

TABLE 6. Contingency table showing observed and theoretical frequencies (in parentheses) of words of 1-2 syllables and Thorndike ratings 1a-10 in a population of 3641 words. Chi-square = 472.0 (df = 14).

	Thorndike Rating							
	1a	*1b*	*2a*	*2b*	*3a*	*3b*	*4a*	*4b*
1	200 (103.4)	164 (100.5)	138 (93.4)	134 (100.5)	102 (87.3)	102 (94.8)	64 (76.6)	106 (90.0)
2	51 (147.3)	80 (143.2)	96 (137.4)	110 (143.2)	110 (124.4)	128 (135.0)	122 (109.2)	127 (136.8)
N	251	244	234	244	212	230	186	233

	Thorndike Rating								
	5a	*5b*	*6*	*7*	*8*	*9*	*10*	Σ	
1	63 (75.4)	83 (32.0)	91 (139.7)	80 (122.4)	63 (117.0)	64 (104.2)	45 (103.8)	1502	(41.2%)
2	120 (107.4)	116 (116.8)	248 (199.0)	217 (174.3)	218 (166.7)	189 (148.5)	207 (147.9)	2139	(58.7%)
N	183	199	339	297	284	253	252	3641*	(99.9%)

*Σf_t = 3631.1 due to discrepancies in rounding.

shows the trends of the relationships of the populations. The numbers of sounds in words increase with higher Thorndike ratings; there is likewise a higher proportion of two-syllable words among higher Thorndike ratings than among lower ones.

Intelligibility Related to Order of Sounds. The sample contained 89 one-syllable words of two sounds. Fifty-five of these were VC in order and 34, CV. There was no reason to reject the hypothesis of a single population in intelligibility scores (t, 0.49, 87 df). Likewise, of the three-sound, one-syllable words, 37 were CCV; 623, CVC; and 16, VCC. There was no reason to reject an hypothesis of a single population among these categories with respect to intelligibility (F, 1.09; 2 and 673 df). The respective mean intelligibility values of the three categories were 60.7, 56.4, and 54.9%.

Of the two-syllable words, there were 1674 with the first syllable accented and 477 with the second syllable accented. The respective mean intelligibility values and standard deviations were 67.1 ± 15.6 and 72.4 ± 15.8 These differ at the one per cent level of confidence (t, 6.16).

Intelligibility and Phonetic Content. Two major analyses treated phonetic units: (a) words containing selected sounds and words not containing the sounds; and (b) one-syllable words containing initial consonant blends and one-syllable words containing the consonants of these blends but not in the same combination; e.g., *glow*, *goal*. The significant results of the first analysis are shown in Table 7. Of the 49 sounds tested, the presence of 18 in words appeared to enhance the intelligibility of the words; the presence of seven appeared to reduce intelligibility.[4]

TABLE 7. The effects of single sounds upon the mean intelligibility of words.

	t	*Level of Confidence*	*N containing*
Sounds that Apparently Enhance Intelligibility			
[ɪ]	5.71	1%	1026
[ɛ]	2.40	5%	432
[æ]	3.85	1%	424
[ə]	5.93	1%	427
[ɚ]	5.79	1%	38
[ɔɪ]	2.76	1%	30
[aʊ]	3.11	1%	97
[b]	1.98	5%	424
[k]	5.90	1%	779
[g]	2.43	2%	257
[s]	6.55	1%	1050
[ʃ]	6.30	1%	163
[tʃ]	5.00	1%	135
[dʒ]	4.93	1%	159
[n]	4.23	1%	865
[l]	3.38	1%	169
[w]	2.98	1%	222
[v]	6.36	1%	1098
Sounds that Apparently Deter Intelligibility			
[ɔ]	3.82	1%	241
[ou]	2.61	1%	255
[p]	3.21	1%	590
[f]	9.16	1%	403
[θ]	10.00	1%	125
[h]	2.87	1%	166
[l]	2.50	2%	882

Combinations of successive consonants are frequently given special attention, particularly in connection with disorders of articulation in speech. The production of these sounds is

[4] Incidental to the analysis of sounds and as a possible aid in the selection of intelligible words, analyses were made to determine whether the initial *letter* of a word might be related to the intelligibility of the word. Words beginning with each letter were compared with all words not beginning with the letter. The following initial letters were associated with greater intelligibility at the 1 or 2% level of confidence: *a*, *c*, *d*, *i*, *j*, *n*, and *s*; the following with less intelligibility at the same level of confidence: *f*, *h*, *l*, *p*, *t*, and *v*.

sometimes viewed as a special task that involves assimilation and, in turn, affects the character of some part of the combination. A series of analyses was made in which the one-syllable words that had an initial blend were compared in intelligibility with one-syllable words that contained the same phonemes not in combination (*glow-goal*). The combinations that were so tested included: [fr], [dr], [θr], [str], [skr], [spr], [kr], [gr], [pr], [tr], [br], [ʃr], [fl], [kl], [sl], [pl], [bl], [gl], [sn], [sk], [st], [sw], [sf], and [sm]. Further tests involved all of the above blends that contain [s], all that contain [l], and [r]. The only blends that appeared to have a significant relationship with intelligibility involved [s] and included individually [sl] (t, 2.20; 61 df), [st] (t, 3.84; 126 df), [sp] (t, 5.27; 73 df), [sm] (t, 3.28; 19 df), and the grouped [s] blends (t, 5.48; 390 df). These combinations appeared to enhance intelligibility.

Four minor analyses were made. Three varieties of *r* were compared in two-syllable words: [r], [ɚ], and [ɝ]. There were 612, 266, and 75 instances of these sounds, respectively, with mean word-intelligibility values of 70.5, 67.9, and 67.8. There was no reason to assume that the sounds affected intelligibility differentially (F, 2.93; 2 and 950 df).

Some vowels are known to be inherently longer than others, that is to consume longer time in utterance (*3*). One-syllable words containing the longer vowels [e], [æ], [ɑ], [ɔ] [o], [u] were compared as a group with words containing shorter vowels [i], [ɪ], [ɛ], [ʌ], [ʊ]. There was no significant difference between the mean intelligibility values of the two groups (t, .14; 1075 df). Likewise, vowels differ in inherent natural sound-pressure level (*3, 6*). One-syllable words containing the six more intense vowels of the 11 enumerated immediately above were compared as a group with the words containing the five less intense vowels. Again, there was no significant difference between the mean intelligibility values of the two groups of words (t, .34; 1075 df). This is not to say that there were not differences among the mean values of the one-syllable words that contained different vowels, e.g., [ɑ] 61.3% vs. [o] 50.7%; rather that the differences were not related to the natural intensity of the vowels. Both of these vowels are relatively intense.

Finally, the intelligibility values of groups of words that contained voiced consonants and ones that contained their voiceless counterparts were compared: [p] [b] (t, 2.76; 135 df), [θ] [ð] (t, 1.16; 30 df), [f] [v] (t, 1.74; 87 df), [t] [d] (t, .99; 203 df), [k] [g] (t, .37; 160 df), [tʃ] [dʒ] (t, .54; 68 df), and [s] [z] (t, 1.14; 108 df). Only the difference associated with [p] and [b] was significant. Numerically the mean of the words that contained the voiced member of the pair was the greater in each comparison except [k] vs. [g].

Discussion and Summary

The foregoing analyses make more elaborate some current information about the intelligibility of words in quiet and in noise. Assuming that the Thorndike word list conforms to a cultural pattern of listener-familiarity with words (not necessarily a pattern of easier-to-utter words), the analyses indicate that the more familiar words possess a characteristic of being the more accurately identified, even among generally common words. This might reasonably be explained by set or expectancy. A related explanation that may be more far reaching is that familiar words represent a special case of the 'limited' vocabulary and that

recognition is enhanced by virtue of the fact that there are fewer opportunities to be in error within the limits of this vocabulary (*16*). This special case of 'context' is not the only influence affecting the recognition of a word. Structural characteristics also contribute to recognition. For example, words with many sounds are more intelligible than ones with few sounds, and the words with lower Thorndike ratings (familiar words) have fewer sounds than the ones with high ratings. Also words of two syllables are more intelligible than words of one syllable and the latter tend to have low Thorndike ratings. Thus two contrary influences, word familiarity and word complexity, appear to operate in the auditory recognition of a word somewhat independently of the phonetic content. The prediction of word intelligibility from phonetic content alone, as may be feasible in the instance of nonsense syllables, becomes virtually impossible. Phonetic elements, however, are also associated with the correctness with which a word can be identified. Eighteen sounds tend to enhance the recognition of words; seven, to detract.[5]

These results do not agree with Mason's with respect to the intelligibility of [s]. However, Mason analyzed words that had been spoken over a carbon microphone in noise. The present sample was recorded with a high-fidelity system in quiet and only heard in noise. This difference might account not only for the discrepancy with respect to [s] in the two studies but also for Mason's finding that 'puckered' sounds are more intelligible than others. The lip position that he described would shield the carbon microphone from room noise during the transmissions that were recorded and improve the S/N ratio of the sounds in question.

An intelligible word would seem first to be a familiar one. Among familiar words, it should have more than one syllable with the accent on the second syllable (in two-syllable words), and without the handicaps imposed by [f], [θ], [h], [i], [ɔ], [p], and [ou] (possibly pronounced [o]). The word might be expected to be more understandable if it contained one of 18 sounds that contribute to intelligibility. Either alternately to the criterion of familiariy or imposed upon it, the word, to be intelligible, should contain more instead of less sounds.

[5] Two of the 18 sounds [ə] and [ɚ] are associated with words of more than one syllable. Thus in the context of this paragraph only 16 sounds should be considered as enhancing recognition apart from the complexity of the word.

References

1. Ausherman, M. and Black, J. W. Formal spoken vocabulary of college students. Ohio State Univ. Research Foundation and U. S. N. School of Av. Med., May 5, 1950. Joint Rept. no. 3.
2. Black, J. W. Final report in summary of work on voice communication. Psychological Corp., Sept. 11, 1945. OSRD Rept. no. 5568. (Office of Technical Services Rept. PBL 12051.)
3. ————. Natural frequency, duration and intensity of vowels in reading. *JSHD*, 14, 1949, 216-221.
4. Dewey, G. *Relativ Frequency of English Sounds*. Cambridge: Harvard Univ. Press, 1923.
5. Egan, J. P. Articulation testing methods II, Psycho-Acoustic Lab., Harvard Univ., Nov. 1, 1944. OSRD Rept. no. 3802. (Office of Technical Services Rept. PBL 22848.)
6. Fairbanks, G., House, A. S. and Stevens, E. L. An experimental study of vowel intensities. *J. acoust. Soc. Amer.*, 22, 1950, 457-459.
7. Fletcher, H. *Speech and Hearing*. New York: D. Van Nostrand, 1929.
8. Fletcher, H. and Steinberg, J. C. Articulation testing methods. *Bell Syst. tech. J.*, 8, 1929, 806-854.

9. FRENCH, N. R. and STEINBERG, J. C. Factors governing the intelligibility of speech sounds. *J. acoust. Soc. Amer.*, 19, 1947, 90-119.
10. HAAGEN, C. H. Intelligibility measurement, twenty-four word multiple-choice tests. Psychological Corp., Sept. 11, 1945. OSRD Rept. no. 5567. (Office of Technical Services Rept. PBL 12050.)
11. ———. Intelligibility measurement. *Speech Monogr.*, 13, 1946, 4-7.
12. JONES, J. B. *Manual of Directions for Enunciation Test*. Iowa City: Bureau of Educational Research and Service, St. Univ. of Iowa, 1934.
13. KENYON, J. S. and KNOTT, T. A. *A Pronouncing Dictionary of American English*. Springfield: G. and C. Merriam, 1944.
14. LEWIS, D. and BURKE, C. J. The use and misuse of the chi-square test. *Psychol. Bull.*, 46, 1949, 433-489.
15. MASON, H. M. Phonetic characteristics of words as related to their intelligibility in aircraft-type noise. Psychological Corp., Feb. 10, 1945. OSRD Rept. no. 4681. (Office of Technical Services Rept. PBL 12160.)
16. MILLER, G. A., HEISE, G. A. and LICHTEN, W. The intelligibility of speech as a function of the context of the test material. *J. exp. Psychol.*, 41, 1951, 329-335.
17. THORNDIKE, E. L. *The Teacher's Word Book*. New York: Bureau of Publications, Teachers Coll., Columbia Univ., 1932.

Vocal Responses During Controlled Aural Stimulation

Chester J. Atkinson

AN EXPERIMENT was designed to investigate some of the effects of the acoustic environment upon the manner in which a person speaks. More specifically, the study was planned to test selected relationships between (a) vocal output and (b) the acoustic environment during the production of monosyllables. The rationale of the study involved theoretical considerations of the acoustic environment and its interaction with speech.

The hearing process is traditionally credited with the perception of three largely instantaneous aspects of speech: pitch, loudness, and quality. This conventional description of speech, however, may be unduly complex. Both pitch and quality are related to frequency, *viz.* events in time. (Rate, including rhythm, also has a time dimension even though it does not have an instantaneous value.) Thus, the perception of sound, including vocal utterance, may be considered as having two basic dimensions: magnitude (sound pressure level) and rapidity of occurrence of events in time (frequency).[1]

[1]From this point of view Wiener's (*4*) autocorrelation function would give a quantitative description of the sounds of speech.

Chester J. Atkinson (Ph.D., Ohio State, 1950) is Supervisor, Sidetone Project, State University of Iowa. This article is based on part of a doctoral dissertation completed under the direction of Professor John W. Black and is adapted from a paper presented at the 1950 Convention of ASHA, Columbus, Ohio.

Wiener (*4*) has explained how the control system for a complex function like speech may include several sensory monitoring systems that feed back information to the generating mechanism. This flow of information (feedback) is utilized as a partial control of the output of the next moment. In speech, hearing probably provides the most important feedback pathway with over-all sound pressure level and fundamental frequency exerting an influence on the production of speech.

The above line of reasoning led to the plan of the present study in which the frequency (pure tone) and sound level of the speaker's acoustic environment were controlled under the assumption that these two parameters sampled essential characteristics of momentary acoustical environments. Limitations in this point of view, beyond those of the above assumption, include the omission from consideration of randomly intermittent acoustic events and of complex sound waves at the speaker's ear.

Black (*1*) studied the effect of the sound pressure level of a limited range of frequencies at the ears of speakers using five frequencies that represented approximately the range of the median fundamental pitches (90-287 cps) of speakers. In the present study the stimuli encompassed the limits of comfortable hearing with respect to sound pressure level and

extended from a low median fundamental frequency of the human voice (80 cps) through the overtone frequencies that are most important for intelligibility (4,000 cps).

Four hypotheses were tested: *a.* The loudness, frequency constant, of a pure tone heard through an earphone has no effect upon the sound pressure level generated by a voice during the reading of monosyllables; *b.* The frequency, loudness constant, of a pure tone heard through an earphone has no effect upon the sound pressure level generated by a voice during the reading of monosyllables; *c.* The loudness, frequency constant, of a pure tone heard through an earphone has no effect upon the fundamental frequency of a voice during the reading of monosyllables; *d.* The frequency, loudness constant, of a pure tone heard through an earphone has no effect upon the fundamental frequency of voice during the reading of monosyllables.

Tests of these hypotheses involved: (1) control of the acoustic environment, (2) measurement of vocal output, and (*3*) the application of statistical tests to assess the significance of the relationships between the stimuli and the measurements of the responses.

Procedure

Twenty-four males read 90 monosyllables during successive exposures to tones that were heard through one earphone in a small sound-treated room. The monosyllables were read at five-second intervals. The reader was exposed to a tone for three seconds before he spoke each syllable. Each monosyllable contained the vowel [ʊ] preceded and followed by a voiceless consonant. The tones were determined by 90 points, the intersections of the monaural equal-loudness contours 10, 20, 30, 40, 50, 60, 70, 80, 90, and 100 db loudness level with the frequency ordinates 80, 100, 150, 200, 250, 500, 1000, 2000, and 4000 cps (*3*). The frequencies were generated by a calibrated oscillator. The sound pressure levels of the tones were established with an artificial ear.

The spoken responses were recorded on a Presto 8 DG disc recorder. Later these discs were played through a power-level recorder (Sound Apparatus Co., 50 db potentiometer, 50 mm./sec.) and the recordings from 12 of the readers were transcribed on a tape recorder (Magnecord, 15 in./sec.). Measurements of the relative sound pressure levels of the responses were read directly from the record of the power-level recorder and were converted to db re .0002 dynes/cm^2 by the addition of a constant correction. Measurements of the fundamental frequency of the responses were read from sound tape. A dipping process was utilized to make the magnetic striations on the tape visible. These striations were counted over as much of each syllable as possible. The value of the fundamental frequency of each utterance was determined by the number of striations in a unit of distance (time) on the tape. To facilitate the measurement of fundamental frequency the voice signal was channelled through a low pass filter and recorded on the sound tape 7 to 8 db above recommended level. A commercial solution for dipping sound tape, 'Visimag' (Magnecessories, Washington, D. C.), yields visible magnetic tracings satisfactorily.[2]

[2]During the progress of the study a suitable solution was prepared from materials that are relatively inexpensive and available

TABLE 1. Summary of analyses of variance: Measurements of sound pressure level of vocal responses due to loudness level of stimulus, 24 speakers.

	Sum of Squares		*Variance*		
Frequency	*Loudness Level* (*df* 9)	*Remainder* (*df* 207)	*Loudness Level*	*Remainder*	*F*
80	213.44	4,596.96	23.72	22.21	1.07
100	484.98	3,913.42	53.89	18.9	2.85**
150	267.42	4,918.38	29.71	23.76	1.25
200	436.23	4,361.77	48.47	21.07	2.30*
250	417.73	3,865.47	46.41	18.67	2.49*
500	759.43	5,307.17	84.38	25.64	3.29**
1,000	292.10	4,681.50	32.46	22.62	1.44
2,000	738.84	4,803.46	82.09	23.21	3.54**
4,000	848.94	4,289.16	94.33	20.72	4.55**

**Significant (*F*) at the 1% level of confidence, *significant at the 5% level of confidence (2.34, 1.83, 9 and 207 degrees of freedom).

Results

Sound Pressure Level of the Responses. The effect of variations in the loudness of the stimulus upon the sound pressure level of the responses, Hypothesis *a*, was treated in nine analyses of variance, one analysis for each frequency of the test tone. The hypothesis could be rejected for six of the nine frequencies, as a change in the loudness of the stimulus was associated with a change in the sound pressure level of the responses in a fashion significant at the 1% level of confidence for four of the nine frequencies, at the 5% level for two other frequencies of the test tone (see Table 1). These changes were all in the direction of increased sound pressure level of the responses to higher loudness levels of the stimulus.

The effect of variations in the frequency of the stimulus tone upon the sound pressure level of the responses, Hypothesis *b*, was treated in 10 analyses of variance, one analysis for each loudness level of the stimulus tone. The hypothesis could not be rejected as the tests of significance indicated that any effect upon the sound pressure level of the responses associated with variations in the frequency of the stimulus were within limits which could be accounted for by chance. A possible exception to this statement is found in the instance of the high-

at a chemical supply counter: iron by hydrogen, petroleum ether, radio service solvent, a 6″ U-tube, and a 2″ length of solid solder. The following technique for using the materials is recommended:

The U-tube, in an erect position, is half filled with a solution of 10 parts of petroleum ether and one part of radio service solvent. Iron by hydrogen is added until the particles of iron nearly touch the inner bend of the tube. The recorded tape is threaded through the tube (a guide wire is helpful) with the recorded surface up. The tape is then threaded through the length of coiled solder, and the solder is slipped into the tube and allowed to fall into the solution.

Resistance is placed on the feeding of the undipped tape, and the tape is pulled through the solution in a series of short rapid movements. Approximately five inches of the tape are pulled through the tube with each movement. This combination of movement and resistance causes the solder to be carried up the side of the tube and then to fall back into the solution. The movement of the solder keeps the iron particles in agitation. The wet process is more effective than a comparable dry one and the short drying time permits the handling of several hundred feet of tape as a unit. A pint of petroleum ether serves for the dipping of more than 6000 feet of tape.

TABLE 2. Summary of analyses of variance: Measurements of the sound pressure level (db) of vocal responses corresponding to the frequency of the stimulus tone at each of 10 loudness levels, 24 speakers.

Loudness Level	*Sum of Squares*		*Variance*		
	Frequency (df 8)	*Remainder (df 184)*	*Frequency*	*Remainder*	*F*
10	293.2	4,528.0	36.7	24.6	1.49
20	253.7	5,406.1	31.7	29.4	1.09
30	75.1	4,950.7	9.4	26.9	0.35
40	203.3	5,808.1	25.4	31.6	0.80
50	76.4	4,613.6	9.6	25.1	0.38
60	88.9	3,667.3	11.1	19.9	0.56
70	162.1	4,347.9	20.3	23.6	0.87
80	250.0	4,048.3	31.3	22.0	1.42
90	173.0	4,307.0	21.6	23.4	0.92
100	603.0	3,722.0	75.4	20.2	3.75**

**Significant (*F*) at the 1% level of confindence (2.60, 8 and 184 degrees of freedom).

est loudness level (see Table 2). Because of the results of the above analyses, no further treatment of the data for the effects of the frequency of the stimulus was indicated.

A further investigation of Hypothesis *a* was indicated. An analysis of variance of the measurements of the sound pressure level of the responses to successive loudness levels was made in a test of zero slope. The loudness variance was 2,586.32 and the remainder variance was 20.10. This yielded a highly significant variance ratio, 128.42 (2.50, 1% level of confidence, 9 and 207 degrees of freedom). This result indicated a change in the sound pressure level of the responses when the pure tone stimulus was varied in loudness level. Because

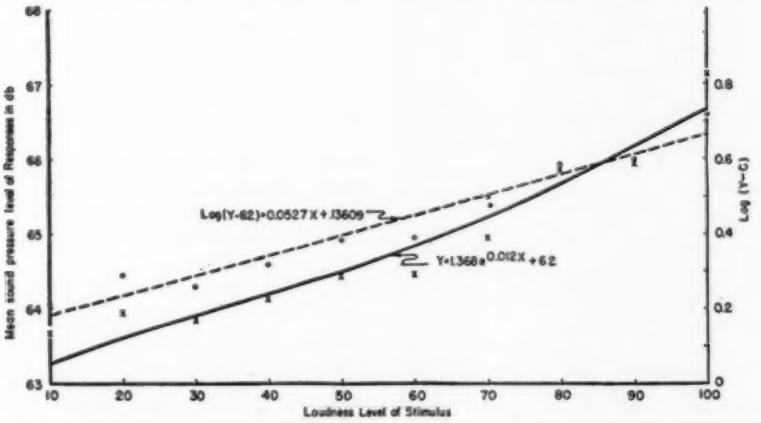

FIGURE 1. Plots of the means of the sound pressure level of the responses to each of the loudness levels. The curve was fitted by the method of least squares. The means of the experimental data are represented by crosses. The variation of the transformed means about the dotted line are represented by circles.

of this change, a test of linearity was applied to the same data. A sub-hypothesis of linearity was tested by Lindquist's Case 4 (2). The sub-hypothesis was rejected as the departure from linearity variance was 360.00 and the remainder variance was 20.10. This yielded a highly significant variance ratio, 17.91 (2.60, 1% level of confidence, 8 and 207 degrees of freedom).

A curve was fitted to the means of the measurements of the sound pressure level of the responses to Loudness Levels 10 through 100. These means were 63.37, 63.58, 63.82, 64.10, 64.43, 64.81, 65.26, 65.80, 66.42, and 67.15 db re .0002 dynes/cm^2. The fitted curve was found to be represented by the following generalized equation:

$$Y = Ae^{mX} + B$$

where X equals the stimulus loudness level, Y the corresponding mean response level in db, A a constant equal to 1.368, e equals 2.71828 and is the base of the Naperian or natural logarithms, m a constant equal to 0.012, and B a constant equal to 62.0 db. The curve and straight line function of the curve are shown in Figure 1.

Fundamental Frequency of the Responses. The effects of the loudness of the stimulus upon the fundamental frequency of the responses of the first 12 of the 24 subjects were analyzed in a test of Hypothesis *c*. These responses furnished an analysis for each frequency of the test tone. The hypothesis was tentatively rejected at the 5% level of confidence and this on only two of the nine analyses, as shown in Table 3.

The effects of the frequency of the stimulus tone upon the fundamental frequency of the responses of the first 12 of the 24 subjects were analysed in a test of Hypothesis *d*. These responses furnished an analysis for each loudness level of the test tone. In nine of the 10 analyses, significance was not approached, hence the hypothesis could not be rejected. In the instance of the responses to the highest loudness level, significance was demonstrated at the 5% level of confidence, see Table 4. Because of the results of the above analyses, no further treatment of these data was indicated for the effect of frequency of the stimulus upon the fundamental frequency of the responses.

TABLE 3. Summary of analyses of variance: Measurements of the fundamental frequency of the vocal responses corresponding to the loudness of the stimulus at each of nine frequencies, 12 speakers.

	Sum of Squares		*Variance*		
Frequency	*Loudness Level (df 9)*	*Remainder (df 99)*	*Loudness Level*	*Remainder*	*F*
80	214.90	7,536.99	23.88	76.13	0.31
100	1,580.57	8,193.53	175.62	82.76	2.12*
150	470.36	9,697.94	52.26	97.96	0.53
200	2,028.67	11,471.53	225.41	115.87	1.95
250	672.30	10,735.90	74.70	108.44	0.69
500	1,743.20	9,030.80	193.69	91.22	2.12*
1,000	682.47	10,865.93	75.83	109.76	0.69
2,000	787.54	6,672.66	87.50	67.40	1.30
4,000	802.20	5,890.10	89.13	59.50	1.50

*Significant (F) at the 5% level of confidence (1.99, 9 and 99 degrees of freedom).

TABLE 4. Summary of analyses of variance: Measurements of the fundamental frequency of the vocal responses corresponding to the frequency of the stimulus at each of 10 loudness levels, 12 speakers.

Loudness Level	*Sum of Squares*		*Variance*		*F*
	Frequency (df 8)	*Remainder (df 88)*	*Frequency*	*Remainder*	
10	346.6	7,549.4	43.32	85.79	0.50
20	662.1	8,987.7	82.76	102.86	0.81
30	321.5	6,995.4	40.19	794.93	0.51
40	159.3	9,130.0	19.91	103.75	0.19
50	287.2	7,445.2	35.90	84.61	0.41
60	170.4	6,032.9	21.30	68.56	0.31
70	667.8	17,932.7	83.48	203.78	0.41
80	205.5	6,499.2	25.69	73.85	0.35
90	471.4	13,005.6	58.93	147.79	0.40
100	2,636.8	11,969.0	329.60	136.01	2.42*

*Significant (F) at the 5% level of confidence (2.05, 8 and 88 degrees of freedom).

A further analysis of Hypothesis *c* was indicated. An over-all analysis was made of the measurements of the fundamental frequency of the responses to successive loudness levels in a test of zero slope. The variance for levels was 2,500.83 and the remainder variance was 585.22. This yielded a significant variance ratio, 4.27 (2.59, 1% level of confidence, 9 and 99 degrees of freedom). The mean values of the fundamental frequency starting with the responses to Loudness Level 10 were: 131.2, 130.5, 130.9, 131.0, 132.3, 133.9, 132.9, 132.0, 133.2, and 135.1 cps. This array of mean values was tested for linearity (Lindquist's Case 4). The hypothesis of linearity was tentatively rejected as the variance due to departure from linearity was 1,451.51 and the remainder variance was 585.22. This yielded a significant variance ratio, 2.48 (2.03, 5% level of confidence, 8 and 99 degrees of freedom).

A curve was fitted by the method of least squares to the means of the measurements of fundamental frequency of the responses. The curve was found to be represented by the following generalized equation:

$$Y = Ae^{mX} + C$$

where X equals the stimulus loudness level, Y the corresponding mean response level in cps, A is a constant equal to 1.117, e is a constant equal to 2.71828 and is the base of the natural logarithms, m is a constant equal to 0.152, and C is a constant equal to 129.24 cps (see Figure 2).

Because the experimental points did not appear to fit the curve well, a test for goodness of fit was run. The F ratio was 0.17 indicating poor fit. It will be remembered that the data rejected an hypothesis of zero slope beyond the 1% level of confidence and also rejected the hypothesis of linearity, but this at the 5% level of confidence. Observation of the data means indicated that no simple curve would describe the means properly.

Discussion

The principal observations from the analysis of the data are:

1. The sound pressure level (db) of the vocal responses tended to increase as the loudness level of the

stimulus environment was increased (Hypothesis *a*). This tendency appeared to be a logarithmic function of the loudness level. It is noteworthy that the unit of measurement, the decibel, is itself logarithmic.

2. There appeared no reason to assume that the frequency of the stimulus affected the sound pressure level of the responses (Hypothesis *b*).

3. The loudness level of a stimulus tone appears to affect the fundamental frequency of a vocal response (Hypothesis *c*).

4. There appeared no reason to assume that the frequency of stimulus tone had an effect upon the fundamental frequency of a voice (Hypothesis *d*).

An application that summarizes these four statements might be: The operational meanings of the direction *read naturally* are different with respect to the sound pressure level and fundamental frequency of the voice depending upon the loudness of the acoustic environment. There is no reason to assume the counterpart of this with respect to the frequencies of the environment.

A plot of the means of the measured sound pressure levels of the responses was exponential with respect to loudness level, resulting in a curve that rose more rapidly at the higher loudness levels. One might speculate that if the growth rate of the curve continued, the sound pressure level of the responses to higher loudness levels might approach a 1 to 1 ratio with the stimulus within the limits of the voice mechanism.

The analyses show no reason to assume that the frequency of the stimulus affected the voice. The voice changes attributable to the frequency

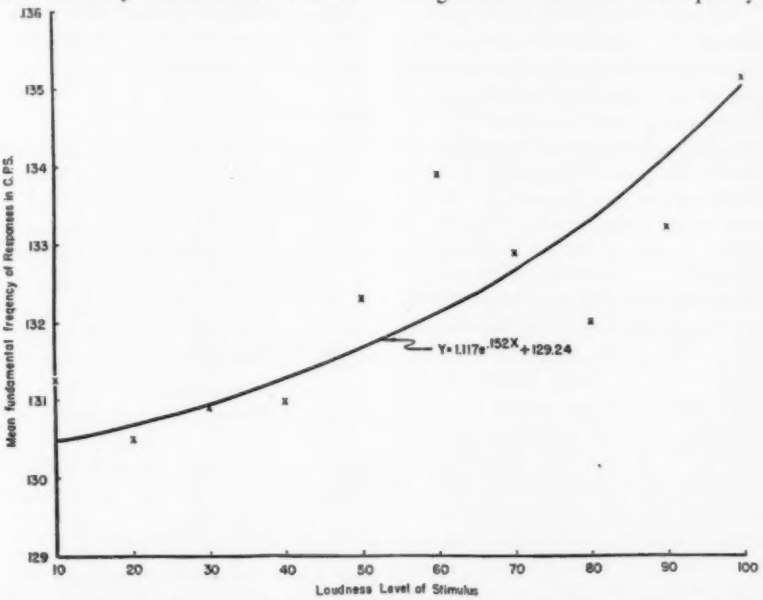

FIGURE 2. Plot of the means of the fundamental frequency of the responses to each of the ten loudness levels and the curve fitted by the method of least squares.

of the stimulus were small in magnitude and non-significant in both the instances of fundamental frequency and sound pressure level. There was a consistent and significant relationship, however, between the fundamental frequencies of the responses and the loudness levels of the stimuli. There was also a consistent and significant relationship between the sound pressure level of the responses and loudness level of the stimulus. These results suggest that the vocal response may be determined rather directly by the loudness of an acoustic environment. From a consideration of the changes in the sound pressure level involved in each of the lower loudness levels, it is apparent that the loudness rather than the sound pressure level of the environment was systematically related to the vocal output.

An exception to the above generalizations is noted. The analyses show there were differences in both fundamental frequency and sound pressure levels of the vocal responses that apparently related to the frequency of the stimulus at Loudness Level 100. This result may relate to any of several possibilities among which are (a) effective interaction between the frequency and loudness of the stimulus at this level, and (b) the possibility that Loudness Level 100 is not correctly charted in current literature.

The sound pressure level of the responses increased approximately four db when the loudness of the stimulus tone increased from Loudness Level 10 through Loudness Level 100. The fundamental frequency of the responses increased approximately four cps under the same conditions. Neither the sound pressure level nor the fundamental frequency of the responses changed systematically when the tone in an earphone was changed from 80 cps through 4000 cps.

In summary, the results of the study indicate that a speaker changes his voice in response to differences in a monaural acoustic environment. The changes demonstrated are attributed to the loudness of the stimulus tone. The responses to the frequency of the stimulus tone, on the other hand, appeared to give no reason to assume an effect on either the fundamental frequency or the sound pressure level of the responses.

References

1. Black, J. W. Some effects upon voice of hearing tones of varying intensity and frequency while reading. *Speech Monogr.*, 17, 1950, 3-6.
2. Lindquist, E. F. Goodness of fit of trend curves and significance of trend differences. *Psychometrika*, 12, 1947, 65-78.
3. Stevens, S. S. and Davis, H. *Hearing*. New York: John Wiley, 1938.
4. Wiener, N. *Cybernetics*. New York: John Wiley, 1948.

Parameter Relationships In The Portrayal Of Signals With Sound Spectrograph Techniques

Gordon E. Peterson

APPLICATIONS of the sound spectrograph (*1*) have been made in a number of fields. The chief interest in the instrument, however, has come from students of speech and language. The following discussion is intended to present the relationships among a number of factors which are fundamental in the visual display of signals on the sound spectrogram. An understanding of these relationships is often of value in the interpretation of patterns produced with the sound spectrograph and in calibrations or modifications of the instrument. This discussion deals with the conventional pattern in which frequency is presented along one axis, time is presented along the other, and intensity is shown by blackness on the paper.

In the conventional revolving paper drum sound spectrograph, the pattern is constructed by drawing a series of lines in time which are adjacent in frequency; one line is drawn for each repetition of the signal. The signal frequencies are continuously shifted by means of a modulator so that they are slowly passed across the analyzing filter.

If the filter is narrower in frequency than the number of cycles traversed per line, then portions of the signal will be omitted in the portrayal. In order to avoid such 'skipping,' it is desirable to have:

$$A. \quad \frac{\text{cps}}{\text{line}} = r \times \text{filter width}$$

where r is a quantity such that $1 > r > 0$.

In the revolving paper drum sound spectrograph:

$$B. \quad \frac{\text{cps}}{\text{line}} = \frac{\text{cps/inch}}{\text{lines/inch}}$$

In the use of Teledeltos paper the lines are burned with a metal stylus. The character of the marking is shown in Figure 1 which shows enlargements of portions of spectrograms with lines drawn by three different stylus widths. These spectrograms were produced by placing a single tone on the spectrograph and allowing it to mark continuously. The automatic gain control in the spectrograph was eliminated, the level at the top of each picture was started well above the overload, and the reproduce gain was reduced 2 db for each 5 lines marked. In the original spectrograms, of which these are enlargements, the lines are at .010 inch spacings; the marking stylus width for (a) is .002 inch, for (b) .012 inch, and for (c) .020 inch. To obtain a usable stylus stiffness both the .002 inch stylus and the .020 inch stylus were

Gordon E. Peterson (Ph.D., Louisiana State, 1939) is engaged in research at the Bell Telephone Laboratories, Murray Hill, N. J.

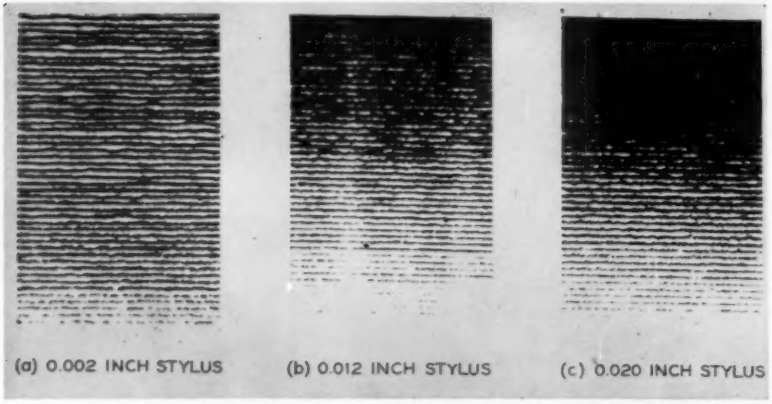

FIGURE 1. Enlargement of portions of spectrograms marked with a continuous tone.

obtained by flattening and grinding the tip of a .012 inch stylus. One was oriented to mark in the narrow direction, and the other was adjusted to mark in the broad dimension.

It is seen in each case that as the level to the stylus is reduced the degree of blackness remains approximately the same, but the line width decreases—and the marking becomes more erratic.

It would appear that if fringe effects from neighboring lines are to be avoided, the lines as marked should not completely fill the space, even at full blackness. Thus, for distinct portrayal a stylus should be chosen such that at maximum marking:

C.

$$\text{width marked (in inches)} = \frac{q}{\text{lines/inch}}$$

where q is a quantity such that

$1 > q > .75$ (approximate).

Resolution and Quantization

As long as r is maintained within the limits indicated in *A* the degree of frequency resolution is primarily determined by the filter width. We may define the *minimum frequency resolution* as the smallest separation of two tones in frequency which is portrayed as two distinguishable signals on the sound spectrogram. It should be noted that a signal tone which is appreciably narrower than the analyzing filter will be marked on the spectrogram with the full filter width. The value of the minimum frequency resolution thus approaches the analyzing filter width.

The analyzing filter width may be expressed in terms of distance on the spectrogram:

D.

$$\Delta F \text{ (in inches)} = \text{filter width (inches)} = \frac{\text{filter width (in cps)}}{\text{cps/inches}}$$

In a similar manner, the degree of time resolution obtained on the sound spectrogram primarily depends upon the transient time of the filter. Since we may write approximately:

F.

$$\frac{1}{\text{filter width (in cps)}} = \text{filter transient time (in seconds)}$$

Then we may consider the *minimum time resolution* as approaching the value of $\frac{1}{\text{filter width}}$.

The distance on the spectrogram occupied by the transient time of the filter is given by the relation:

$$G.\ \Delta T \text{ (in inches)} = \text{filter transient (in inches)} = \frac{1}{\text{filter width (in cps)}} \times \frac{1}{\text{seconds/inch}}$$

For some purposes it is convenient to consider the spectrogram as composed of a series of elementary areas or quanta, each having the dimensions of $\Delta F \times \Delta T$.

Effective Values

The above equations are valid either when the units pertain to the dimensions of the original signal or when the units pertain to the analyzing circuits, so long as the two systems are not confused, of course: The former we shall call 'effective'–E, the latter 'spectrograph'–S.

Signal transformations are normally obtained by changes in speeds of a separate recorder or by linear shifts in frequency by means of modulation. Such transformations are normally obtained with equipment external to the spectrograph, and the resulting signal is then supplied electrically to the sound spectrograph. In either the case of changes in recorder speeds, shifts by means of modulation, or both the relations between E and S for that portion of the signal which falls within the range of the spectrograph will be presented by the following:

Let:

R_r = recording speed of the separate recorder

R_p = playback speed of the separate recorder

S_r = spectrograph recording speed

S_p = spectrograph playback speed

$$H.\ \text{E cps/inch} = \text{S cps/inch} \frac{R_r\ S_r}{R_p\ S_p}$$

$$I.\ \text{E seconds/inch} = \text{S seconds/inch} \frac{R_p\ S_p}{R_r\ S_r}$$

$$J.\ \text{E filter width} = \text{S filter width} \frac{R_r\ S_r}{R_p\ S_p}$$

In the case of the revolving paper drum sound spectrograph:

$$K.\ \text{analyzing time (in seconds)} = \frac{\text{full band width (in cps)}}{\text{cps/line} \times \text{spectrograph play rps}}$$

Spectrogram Aspect

Consider two spectrographs which cover the same range of frequency and time, but which mark pictures which are different in size. The same signal may be supplied to both of these instruments and the spectrogram from one can be enlarged to the same dimensions as the spectrogram from the other instrument.

If these two spectrograms are to appear the same, there are three fundamental factors which must have the same value in both instruments:[1]

filter width
cps/line
the relation of cps/inch to seconds/inch

This latter factor we may define as aspect ratio:

$$L.\ \text{aspect ratio} = \frac{\text{cps/inch}}{\text{seconds/inch}}$$

When signals in which the record or reproduce speeds have been altered are played to the same sound spectrograph, the resulting spectrograms again have three factors in common:[2]

[1] In addition to the three factors named, it is obvious that if the cps/line and the frequency range are the same in the two spectrograms, the total number of lines must be the same.

[2] Obviously the lines/inch and the total number of lines will be the same in the spectrograms.

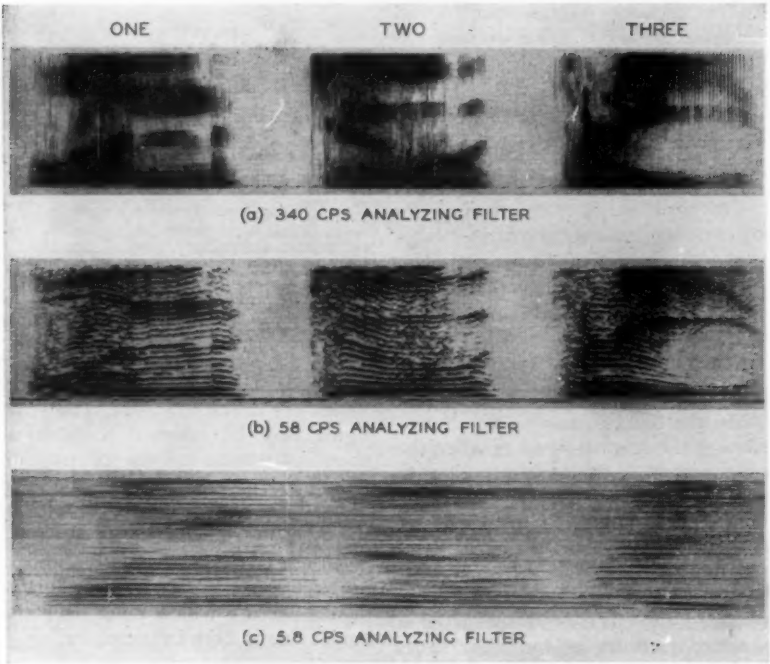

FIGURE 2. Spectrograms of the digits 'one, two, three.'

$\triangle F$ (in inches)
$\triangle T$ (in inches)
the product of cps/inch $\times$ seconds/inch

This factor we define as aspect product:

M.

aspect product = cps/inch $\times$ seconds/inch

It will be noted that aspect ratio has the dimensions of 1/seconds squared and that aspect product has the dimensions of 1/inches squared.

Appendix A

As long as r in equation A is maintained constant there is an advantage to the use of a very narrow analyzing filter under certain conditions. In particular, if the signal tones remain appreciably narrower than the filter, an improvement in signal-to-noise ratio should be realized in the display. This follows from the fact that the noise power through the filter increases with the bandwidth of the filter, whereas the energy passing the filter due to a tone much narrower than the filter will be independent of the bandwidth of the filter. Thus the marking due to noise will be reduced, and that due to steady tones will remain the same when the filter is made narrower. When the filter width is made narrower, appropriate changes in such factors as cps/line must be made, however, in order to achieve satisfactory portrayal.

For example, consider the use of a filter one-tenth that of the present narrow filter in the model D spectrograph, which was the type of instrument employed in making most of the pictures of visible speech (2).

In the instrument employed in marking Figures 1 and 2, in Effective Values:

filter width = 58 cps
cps/inch = 1750
lines/inch = 100
seconds/inch = .2

from B $\quad \text{cps/line} = \dfrac{1750}{100} = 17.5$

from A $\quad r=\dfrac{17.5}{58}=.302$

Thus the limits of r specified in A are observed.

minimum frequency resolution=58 cps
minimum time resolution=.017 seconds

from D ΔF (in inches) $=\dfrac{58}{1750}$
$=3.3\times10^{-2}$ inches

from G ΔT (in inches) $=\dfrac{1}{58}\times\dfrac{1}{.2}$
$=.086$ inches

from L $\quad$ aspect ratio$=\dfrac{1750}{.2}=8.75\times10^{3}$

from M $\quad$ aspect product$=1750\times.2=350$

from K $\quad$ analyzing time$=\dfrac{3500}{\frac{78}{60}\times 17.5}$ sec.
$=2.56$ minutes

The Desired Effective Values

If we maintain the same value of r then A becomes:

cps/line$=.302\times5.8=1.75$

If we maintain cps/inch the same then according to B:

$$\text{lines/inch}=\frac{1750}{1.75}=1000$$

minimum frequency resolution=5.8 cps
minimum time resolution=.172 seconds

from D ΔF (in inches) $=\dfrac{5.8}{1750}=3.3\times10^{-3}$

from G ΔT (in inches) $=\dfrac{1}{5.8}\times\dfrac{1}{.2}=0.862$

L and M show that the aspect ratio and aspect product remain unchanged. There are two losses, however, which result from the increase in frequency resolution achieved by dividing the filter width by a factor of 10.

a. ΔT has been increased by a factor of 10, so that transient signals will be stretched out in time on the spectrogram. This may be corrected in part by compressing the time dimension on the spectrogram, that is, by employing a smaller paper drum or by employing a larger reproducing disc so that more time may be analyzed.

b. According to K the analyzing time has been increased by a factor of 10.

$$\text{analyzing time}=\frac{3500}{\frac{78}{60}\times 1.75}\text{ seconds}$$
$$=25.6\text{ minutes}$$

Figure 2 has been made to illustrate the effect of filter width upon the various parameters. The words 'one, two, three' were recorded on the model D spectrograph and were then analyzed with the three filters whose characteristics are shown in Figure 3. Since the reproduce speed in this spectrograph is approximately 3.12 times the recording speed, the effective filter widths are approximately one-third those shown in

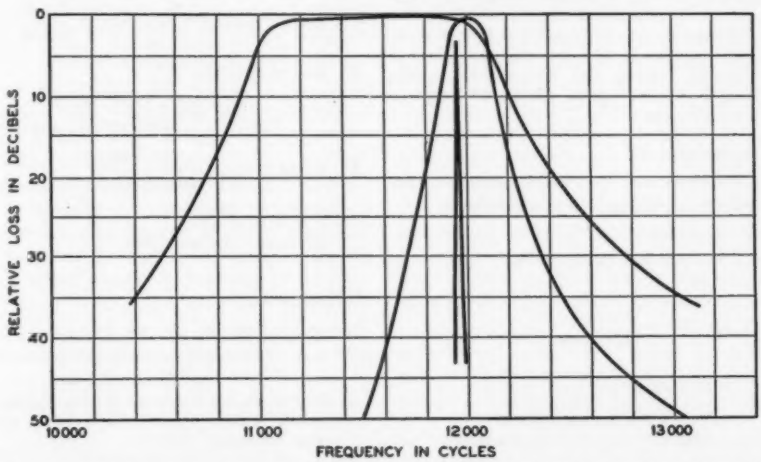

FIGURE 3. The frequency characteristics of the three filters employed in marking Figure 2.

TABLE 1. Effective values of the various parameters of Figure 2.

	(a)	(b)	(c)
filter width (in cycles)	340	58	5.8
cps/inch	1750	1750	1750
seconds/inch	.2	.2	.2
cps/line	17.5	17.5	17.5
stylus width (in inches)	.012	.012	.012
minimum frequency resolution (in cps)	340	58	5.8
minimum time resolution (in seconds)	.0029	.017	.172
ΔF (in inches)	.194	3.3×10^{-3}	3.3×10^{-3}
ΔT (in inches)	.0147	.086	.862
aspect ratio	8.75×10^{3}	8.75×10^{3}	8.75×10^{3}
aspect product	350	350	350

Figure 3. Filter width is expressed here in terms of points 3 db below the maximum.

Figure 2 (a) is for the 340 cps filter, 2 (b) is for the 58 cps filter, and 2 (c) is for an approximation to the 5.8 filter. Full band control was employed in marking 2 (a) and narrow band control, with the same conditions of gain preceding the analyzing filter, was employed in 2 (b) and 2 (c).

To summarize, the effective values of the various parameters of Figure 2 are listed in Table 1.

The spectrogram in Figure 2 (c) is displaced relative to the others due to the slow build-up time of the filter. While traces of the digits can be found in Figure 2 (c) it is evident that this condition represents a rather striking incorrect choice of parameters. This is also evident from the table: for example, the filter width is 5.8 cps while the cps/line is 17.5, so that considerable skipping results; also ΔT is 0.862 inches long in a spectrogram whose full length is only 12 inches.

Appendix B

For reference the various equations appearing in the paper are listed below.

A. cps/line $= r$ filter width
where r is a quantity such that $1 > r > 0$

B. $\text{cps/line} = \dfrac{\text{cps/inch}}{\text{lines/inch}}$

C. $\text{width marked} = \dfrac{q}{\text{lines/inch}}$
where q is a quantity such that $1 > q > .75$ (approximate)

D. $\Delta F \text{ (in inches)} = \dfrac{\text{filter width (in cps)}}{\text{cycles/inch}}$

F. $\dfrac{1}{\text{filter width (in cps)}} = \text{filter transient time (in seconds)}$

G. $\Delta T \text{ (in inches)} = \dfrac{1}{\text{filter width}} \times \dfrac{1}{\text{seconds/inch}}$

H. $E \text{ cps/inch} = S \text{ cps/inch} \dfrac{R_r S_r}{R_p S_p}$

I. $E \text{ seconds/inch} = S \text{ seconds/inch} \dfrac{R_p S_p}{R_r S_r}$

J. $E \text{ filter width} = S \text{ filter width} \dfrac{R_r S_r}{R_p S_p}$

K. $\text{analyzing time} = \dfrac{\text{full band width (in cps)}}{\text{cps/line} \times \text{spectrograph play rps}}$

L. $\text{aspect ratio} = \dfrac{\text{cps/inch}}{\text{seconds/inch}}$

M. aspect product = cps/inch × seconds/inch

References

1. KOENIG, W., DUNN, H. K. AND LACY, L. Y. The sound spectrograph. *J. acoust. Soc. Amer.*, 17, 1946, 19-49.
2. POTTER, R. K., KOPP, G. A. AND GREEN, H. C. *Visible Speech.* New York: D. Van Nostrand, 1947.

Letters To The Editor

SIR:

This is an unsolicited account of an experience in trumpet stuttering from a former case. While similar cases have been known to all of us, of course, the present description is more coherent than most.

I feel that the readers of this journal, 'depending upon their known theoretical bias,' will be able to find here support for their beliefs and dysphemia. It should support beliefs in oral eroticism, semantic misdiagnosis, and conditioning. *Cornetophemia* would be a good word for it, and I give it freely to the Indians so that their reservation bands can begin to have trouble.

I can vouch for the accuracy of the factual report.

C. VAN RIPER
Western Michigan College of Education

Report of Stuttering on a Musical Instrument

I had the misfortune of taking trumpet lessons under a man who displayed marked projective hostility toward me. It had always been difficult for me to control my speech when talking to this man, because I could somehow sense that he was very impatient and probably disgusted with my inadequacy to communicate successfully in speech. As I analyze the situation from a distance, he both enjoyed and hated to see and listen to me talk. He fiendishly enjoyed listening to the grotesque noises that emanated from my throat, and to see me struggle with my words, because it gave him a rare opportunity to gaze at a person in distress and thank the Lord that, despite his inadequacies in personal appearance, stuttering was one thing he wasn't cursed with. At the same time he hated to hear and see me talk, because it only reminded him of his own shortcomings as a member of the human race. As time went on he came to hate everything about me because my big weakness, my inability to talk normally, only reminded him of the face he encountered in the mirror above the washbowl every morning. He was dissatisfied with himself and dissatisfied with anyone who resembled himself in any way.

During my first semester of private lessons with this man my speech was horrible. It would have been much easier for me to talk had he clearly showed his dislike for me, for then the pressure to please the man would have left me and I could have adopted a more casual and carefree attitude in the situation. But in this case, as in many others, I was exceedingly vulnerable to his hostility, hidden by a thick coat of veneer in the form of a toothy smile, a quick wink of the eye, and an anemic pat on the back when I played a good scale. It all meant, to me, that this man was a good Joe after all, and that I had to do my best to please this 'regular guy.' That meant that I had to try hard to speak correctly, and this only made my throat rumblings and facial contortions all the more intense, so much so that the man nearly jumped out of his chair during one of my more violent spasms.

At the beginning of the second semester my speech was noticeably better, so much so that I somehow managed to talk to my teacher without

having the throat noises occur. But when I came to do my warm-up routine before him at the beginning of my first lesson of the semester, a strange thing happened. I had difficulty striking the first note. I would bring the horn up to my lips and get my embouchure ready to play, but I couldn't make an attack. The attack came only after a series of grunts in the throat, accompanied by a few short gasps. My hands and forehead began to sweat profusely, and I soon found myself in worse shape psychologically than in the previous semester when I was struggling to talk in the situation. For I found myself having the same difficulty playing the trumpet before him the second semester as I did talking before him the previous semester! I was stuttering on the trumpet! Imagine my anxiety when I was playing a triple-tongueing passage—having been able to start it only after several grunts in the throat—and having to stop in the middle for a breath, and not being able to continue because I stuttered too badly! All that came out the bell of the instrument was a confused blur of spasmodic noises that left me extremely frustrated and my teacher extremely d i s g u s t e d. He harped at me for not getting a clear tone and blamed the difficulty on what he presumed to be too thick an upper lip. He suggested I change to trombone.

As I look back upon this situation, I realize that whatever shortcomings I had in my trumpet lessons were largely psychological. My stuttering on the trumpet was an example of transferance of anxiety in a fear situation. The fact that I couldn't talk well before my teacher caused my great anxiety the first semester. The second semester, I entered his studio talking much better, but the basic anxiety to please the man was still there. Where was that anxiety to go? It couldn't just vanish into thin air; it had to hook itself onto something. In that situation, therefore, the trumpet became an ideal vehicle for me to unconsciously show my teacher that, though I was speaking better, I was still a wretch in his eyes, and if I couldn't express my inadequacy through my speech, I'd express it through my horn. As a result, I began stuttering on the trumpet, for playing it is, like speaking, an oral activity demanding also movements of the lips, tongue and throat.

It is interesting to note that I did not start to stutter on my trumpet before six months ago, though I have been playing the instrument for thirteen years and stuttering nearly all my life. I attribute this to the fact that during those years I was so preoccupied with my stuttering every time I spoke that I never stopped to think that I could just as easily stutter when I played the trumpet, due to the fact that both activities involve the same musculatures. It was only when my speech anxiety began to leave me and I began to get confidence in my ability to talk well, that I began to have a similar 'speech impediment' on the trumpet.

Conquering my trumpet stuttering meant training similar to conquering my speech stuttering, but involved mostly the acquisition of confidence by playing in public as much as possible.

SIR:

On page 132 of the June, 1952, issue of the *Journal of Speech and Hearing Disorders*, in the report of the Association's Midcentury White House Conference Committee, the following phrases appear: '*basic* training (roughly M.A. degree level) in speech pathology and audiology . . .' and '. . . *advanced* training (Ph.D. degree level) in the field.' On pages 133-134 of the same issue of the *Journal* the follow-

ing are to be found: '. . . trainees with basic certification only (M.A. degree or less) . . .' and '. . . both basic and advanced certification requirements (M.A. and Ph.D. degrees).'

The inappropriateness of the parenthetical phrases for the illustrative purposes they were intended to serve has been called to the attention of their author, the chairman of the committee. Insofar as the parenthetical expressions imply that the M.A. and Ph.D. degrees are officially interpreted by the American Speech and Hearing Association as professional, as distinct from academic, degrees, and insofar as they suggest that the Association includes these degrees in its certification requirements, they are misleading and in error. The degrees were referred to in an inept attempt to render meaningful in terms familiar to academically oriented readers the approximate levels of training represented by the Association's basic and advanced levels of certification. For an official statement of the Association's certification requirements, the reader is to be referred to the same issue of the *Journal*, pages 249-254.

WENDELL JOHNSON, Chairman
ASHA Midcentury White House
Conference Committee

SIR:

Reluctantly, I feel impelled to express disagreement with Dr. Spencer Brown in his editorial which appeared in the last (Sept., 1952) issue of the *Journal*.

First, let me say that I, too, prefer to be called a speech correctionist, rather than a speech correction teacher. But from this point our disagreement begins. I cannot reconcile myself to the argument that courses in teaching methods, or other related courses in Education, or yea, even a teacher's certificate, are not necessary. To me, teaching experience, or acquaintance with teaching methods and problems of teachers is most essential knowledge for the speech correctionist to possess. There are several reasons; I shall name but three:

1. The speech correctionist will then be able to incorporate in his approaches techniques familiar to the child and thus save time in establishing rapport, and in accomplishing therapeutic aims.

2. He will be better able to correlate his program, his methods and techniques, his materials with what and how the child learns in the classroom.

3. And, what is probably the most important of all, he will be better able to work with the classroom teacher in securing her cooperation in working not only with the children who leave her class to come to him periodically but with those children who have lesser speech defects or those whom he does not take into his classes for one reason or another. He will be better able to accomplish the latter objective if he is familiar with the classroom teacher's philosophy, methodology and subject matter.

Of course, I also agree with Dr. Brown that requirements for an *excessive* amount of education courses and training are detrimental to adequate preparation of a good speech correctionist; they take up the time which should be devoted to speech correction. But I do believe that the proper admixture of the right education courses, even to obtaining a teacher's certificate in related areas is not antagonistic to the adequate training of speech therapists.

THEODORE MANDELL
Detroit Public Schools

Book Reviews

HOLDSWORTH, W. G. *Cleft Lip and Palate.* New York: Grune and Stratton, Inc., 1952. Pp. 126. $5.50.

The foreword to this treatise ends with the statement that 'readers will be charmed to have everything that is known about cleft lip and palate surgery in a neat and readable form.' Although one realizes that no book contains everything that is known about any subject, it is easy to excuse the exaggeration, for this is truly an admirable book.

After a clear and well-illustrated discussion of anatomy, function, and embryonic development of the lips, palate, and related structures, the author describes in detail many of the operations for the repair of clefts of the lip and palate. Though the emphasis is on current practice in Great Britain, there are many references to the work of surgeons in the United States and elsewhere. The historical material is good, but there is no attempt to treat the many operations of the past as exhaustively as was done by Dorrance. There is a good discussion of procedures used in the correction of deformities secondary to the cleft or its repair. The book closes with chapters on nursing care and anesthesia.

If the speech pathologist is disappointed in finding less than two pages devoted to speech training, he should recall that the author is a surgeon who is writing primarily for other surgeons. The definitive book on cleft palate from the point of view of the speech pathologist has not yet been written, nor has anyone essayed the more ambitious job of combining in one volume the viewpoints and problems of surgery, prosthodontics, speech pathology, public health, etc. As an up-to-date reference book for all who are interested in cleft palate, however, Dr. Holdsworth's book can be heartily recommended.

SPENCER F. BROWN.
University of Minnesota

AIKIN, W. A. *The Voice: An Introduction to Practical Phonology.* (Rev. Ed. by H. St. John Rumsey) New York: Longmans, Green and Co., 1951. Pp. 165. $3.00.

To those familiar with earlier editions of this work, it may be said that the new edition by Rumsey has neither modified nor modernized the original to any great extent. To those unfamiliar with earlier editions we report that this book is *Old School.* Although the philosophy of the authors indicates their intention to write of 'Phonology, the Science of Vocal Sound' and to provide directions for teaching voice based on these principles, there is no indication of familiarity with the work of modern voice scientists. Its value to most current readers will be primarily historical.

FRANKLIN H. KNOWER.
Ohio State University

FIELD-HYDE, F. C. *The Art and Science of Voice Training.* London: Oxford University Press, 1950. Pp. 223. $3.25.

'This book never had a beginning! Neither had its author any intention or desire to write a treatise of any kind on the voice.' This quotation taken from the preface of the book adequately explains the lack of organized information in the pages that followed. The title might well have been improved had the word *Science* been eliminated. The author was writing primarily for the music teacher and took little cognizance of voice research except for a corrupted interpretation of the Bell Telephone Laboratories' film on voice production. His section on the anatomy of the larynx was done in an inadequate manner and the author apparently has but little conception of the function involved. It is the opinion of the reviewer that the book has little value for the speech pathologist.

MCKENZIE BUCK.
Eastern Illinois State College

STONE, ELEANOR B. AND DEYTON, JOHN W. *Corrective Therapy for the Handicapped Child.* New York: Prentice-Hall, Inc., 1951. Pp. 315. $3.75.

According to the authors, 'the primary purpose of the book is to treat the subject

---

Book Reviews is edited by Kenneth Scott Wood, University of Oregon.

of physical and health education, including guidance, for all handicapped children from all angles in order to help physical education teachers in charge of these groups better meet the needs of their pupils as they arise.'

Although this book contains little of particular interest to the readers of this *Journal*, the authors at least bow in the direction of children with hearing and speech problems. The chapter entitled *Other Deviations of School Children* contains five and one-half pages regarding the problems of hearing; and one-half page is devoted to a discussion of speech involvements. With this coverage, it is not surprising to observe that the use of the 4-A audiometer is recommended when possible, and when it is not available, coin-click, whispered-voice, and watch-tick tests are suggested.

There are two chapters, *Social Adjustment of the Physically Handicapped* and *Personality Development and Mental Health*, which are of interest, largely because of their naiveté, superficiality, and oversimplification.

Two short chapters are concerned with cerebral palsy, both of which are so general as to be of scant value to the so-called corrective therapist.

In view of the nation-wide interest in the field of rehabilitation, the manifold problems of the handicapped child will doubtless come to ever-increasing attention. It is to be hoped that subsequent books on this subject will more nearly serve to reduce the void than the present volume.

ROBERT HARRINGTON.
Orthopaedic Hospital
Los Angeles

WHITEHURST, MARY W. AND MONSEES, EDNA K. *Auditory Training for the Deaf*. Washington, D. C.: The Volta Bureau, 1952. Pp. 99. $3.12.

In the last decade the vacuum tube hearing aid has undergone tremendous improvement electronically; the attitude toward its use has made slow, perhaps, but steady progress; and the educational approach to the use of the hearing aid has advanced considerably. It is to the last consideration that *Auditory Training for the Deaf* is addressed.

The foreword by W. G. Hardy of Johns Hopkins University is a precise statement of what is meant by auditory training. The introduction by the authors describing their approach to the problem is concise and to the point. The remainder of the book consists of 38 lessons to be followed by the teacher. As in any such book there are obvious pit-falls. It is not a book that will be of particular value to those trained in the field of audiology. But in an audiology practice which serves a predominantly rural population and where trained teachers are at a minimum, one often finds a need for a book that can be recommended to the parent or friend of a hearing aid user and one that will, if followed conscientiously, help him to a better use of his instrument. This is such a book.

JACQUELINE KEASTER.
State University of Iowa

LEE, IRVING J. *How to Talk With People: A Program for Preventing Troubles That Come When People Talk Together*. New York: Harper and Brothers, 1952. Pp. 176. $2.00.

As its purpose, this book attempts to change the usual 'talking at' complex to a 'talking with' orientation. A number of workable corrective measures are suggested such as exercises on listening, examinations, of generalizations, more attention to the problem, less to immediate solution, the case method of problem presentation, the advantages of compromise, and keeping the talk on issues instead of on personalities. Although the basis for the book is general semantics, there is a minimum of jargon; theory is backed by experience; the abstract is made concrete by example. The book has value as an aid to speech and hearing groups, to discussion, and to conference participants.

ANTHONY HILLBRUNER.
University of Oregon

KUHLEN, RAYMOND G. AND THOMPSON, GEORGE G., eds. *Psychological Studies of Human Development*. New York: Appleton-Century-Crofts Co., 1952. Pp. 533. $3.50.

This collection of 71 research and theoretical papers provide access to some of the studies of psychological growth trends from infancy to senescence. The papers were selected to provide a sampling of original writings with respect to important areas of research in the psychology of human development. Most of them have been adapted and abridged. The editors of this volume have aimed at making available to students a collection of primary source materials which are admittedly of uneven scientific quality, but which utilize a wide variety of research procedures.

LEOPOLD, WERNER F. *Bibliography of Child Language*. Evanston, Ill.: Northwestern University Press, 1952. Pp. 115. $2.00.

Here is an extensive list of titles in the field of child language development arranged alphabetically by author and indexed by topic. Emphasis has been given to the normal language learning of children below school age, especially during the first two years, and to child bilingualism. There is no emphasis on speech pathology, or speech therapy, but a liberal sprinkling of titles in these areas are given. Many of the entries are annotated.

McGEOCH, JOHN A. AND IRION, ARTHUR L. *The Psychology of Human Learning*. (2nd ed.) New York: Longmans, Green and Co., 1952. Pp. 596. $5.00.

This book presents a substantial portion of the research findings in the field of learning. Although the book deals in the main with *human* learning, a considerably greater amount of space has been devoted to *animal* learning than was contained in the first edition in 1942. Topics treated include: Concepts and Methods; Conditioned Response Learning; Intraserial Phenomena; Distribution of Practice and Reminiscence; Law of Effect; Transfer of Training; Retention and Forgetting; Learning as a Function of the Material Learned and of Certain Modes of Practice and Presentation; and Individual Differences in Learning. An extended bibliography is given for each of the 12 chapters.

TINKER, MILES A. *Teaching Elementary Reading*. New York: Appleton-Century-Crofts, Inc., 1952. Pp. 351. $3.25.

An exposition of the principles and practices underlying reading instruction. Interpretations are based upon research findings and experience derived from classroom practice. Departing somewhat from the traditional structure of texts in this field, the author treats the developmental aspects of reading in a series of separate chapters dealing with the roles played by word recognition, vocabulary growth, development of comprehension, and the like. Special chapters are devoted to remedial reading in the classroom, adjusting instruction to individual differences, and materials for reading. A bibliography of 195 entries is included.

O'ROURKE, JOHN T. AND MINER, LEROY M. S. *Oral Physiology*. St. Louis: C. V. Mosby Co., 1951. Pp. 333. $5.00.

Chapters are included on the prevalence of dental disease, the functions of the mouth, mastication and its relationship to other structures and functions, saliva, and adaptations to deficient masticatory function. An extensive bibliography is given for each of the 15 chapters.

MOREHOUSE, LAURENCE E. AND COOPER, JOHN M. *Kinesiology*. St. Louis: C. V. Mosby Co., 1950. Pp. 435. $4.50.

This is a study of body movements directed mainly to students of athletics, physical education, and therapy. Abnormal or pathological conditions affecting motion are discussed incidentally. Applications of kinesiology are made in analysis of movements, fundamentals of successful performance, and also in testing new methods of performance.

ADKINS, DOROTHY C. AND LYERLY, SAMUEL B. *Factor Analysis of Reasoning Tests*. Chapel Hill: University of North Carolina Press, 1952. (Mimeographed) Pp. 122. $2.00.

This is a report of a study carried out under U. S. Army contract for the purpose of clarifying factors in the realm of reasoning. The first part reports a factor analysis of 38 Air Force tests. Part Two describes a major factor analysis of 65 other tests of reasoning administered to 200 Army men. Each of the tests is described. The study failed to confirm a *general reasoning* factor and did not yield any factor to which the description *non-verbal reasoning* seemed to apply.

POLLAK, OTTO AND OTHERS. *Social Science and Psychotherapy for Children*. New York: Russell Sage Foundation, 1952. Pp. 242. $4.00.

This is a report of a study undertaken jointly by the Russell Sage Foundation and the Jewish Board of Guardians to determine ways in which the social sciences may enrich child psychotherapy. The report examines the implications of family structure, social interaction, anxiety, extra-familial influences, culture conflicts, and age-sex factors. It also considers the effective use of volunteers in treatment and the necessity for setting limited treatment goals.

HARTLEY, RUTH E., FRANK, LAWRENCE K. AND GOLDENSON, ROBERT M. *Understanding Children's Play*. New York: Columbia University Press, 1952. Pp. 372. $3.50.

This book is based on an exploratory study of children's play carried out under a two-year grant from the National Institute of Mental Health with facilities provided by the Caroline Zachry Institute. The authors discuss such topics as dramatic play, block-play, finger-paint experience, the use of graphic materials, clay, water-play, and music and movement. Selected recorded observations of 180 children from two to six are used to show the specific ways in which play as well as creative and expressive activities serve as indicators of the development of the child's personality. Suggestions to observers of children and methods of recording observations are given.

DOLCH, EDWARD W. *Psychology and Teaching of Reading*. (2nd ed.) Champaign, Ill.: Garrard Press, 1951. Pp. 520. $3.50.

This volume discusses the mental processes involved in reading and the development of these processes. Topics treated include: the nature of reading, development in reading, readiness, sight vocabulary, independent word attack, the teaching of sounding, and reading and study.

JEFFRESS, LLOYD A., ed. *Cerebral Mechanisms in Behavior: The Hixon Symposium*. New York: John Wiley and Sons, Inc., 1951. Pp. 311. $6.50.

This volume is a report of a symposium on cerebral mechanisms held at the California Institute of Technology in 1948. Participants included K. S. Lashley, Wolfgang Köhler, Warren S. McCulloch, John von Neumann, Ward C. Halstead, and Heinrich Klüver, each of whom presented a paper. Twelve others participated in discussions, transcripts of which are included in the book. A considerable amount of the material is related to various aspects of linguistic functions of the cerebral mechanism.

LLOYD, LL. S. *Music and Sound*. (2nd ed.) London: Oxford University Press, 1951. Pp. 181. $2.75.

This book is primarily a presentation of acoustic science for the student of music. The author begins with a study of the scale and proceeds to the study of dissonance. He goes on to inquire into the nature and properties of sound and the sensitiveness of the ear. In the main, the subject is approached from the point of view of the history of musical composition.

ALEXANDER, FRANZ AND ROSS, HELEN, eds. *Dynamic Psychiatry*. Chicago: University of Chicago Press, 1952. Pp. 578. $10.00.

This is a multi-author book in which the mutual interactions of psychoanalysis with allied fields are discussed by 15 experts in their respective disciplines. The first part deals with the basic concepts which have influenced the growth of psychiatry proper and the borderline subjects; the second, with clinical application of these concepts; and the third, with the extended influence of psychoanalytic theory on the current development in allied fields.

RANDALL, ROBERT H. *An Introduction to Acoustics*. Cambridge, Mass.: Addison-Wesley Press, Inc., 1951. Pp. 340. $6.00.

In this textbook on acoustics for the student who has had a year's study of college physics and calculus, one chapter of 26 pages is devoted specifically to speech and hearing. Over 280 topics are discussed in 12 chapters.

Current Publications

AMES, L. B. AND OTHERS. *Child Rorschach Responses: Developmental Trends from Two to Ten Years*. New York: Harper and Brothers, 1952. Pp. 350. $7.50.

APPLEGATE, MAUREE. *Everybody's Business —Our Children: A Book for Teachers and Parents*. Evanston, Ill.: Row, Peterson and Co., 1952. Pp. 301. $3.00.

ARTHUR, SNOWDEN. *Vocabulary, Semantics, and Intelligence*. Bethesda, Md.: Lexicon Press, 1952. (Mimeographed) Pp. 115. $1.50.

BECK, SAMUEL J. *Rorschach's Test: Advances In Interpretation*. (vol. 3) New York: Grune and Stratton, 1952. Pp. 301. $5.50.

BENDA, CLEMENS E. *Developmental Disorders of Mentation and Cerebral Palsies*. New York: Grune and Stratton, 1952. Pp. 565. $12.75.

BERNSTEIN, L. AND WEATHERALL, M. *Statistics for Medical and Other Biological Students*. Baltimore: Williams and Wilkins Co., 1952. Pp. 177. $4.00.

BERRIEN, FREDERICK K. *Practical Psychology*. New York: The Macmillan Co., 1952. (Rev. ed.) Pp. 655. $5.00.

BRAIN, W. RUSSELL. *Mind, Perception, and Science*. Springfield, Ill.: Charles C. Thomas, 1952. Pp. 96. $2.50.

BRIERLEY, MARJORIE F. E. *Trends in Psychoanalysis*. (International Psycho-analytical Lib., No. 39). New York: Anglobooks, 1952. Pp. 319. $6.00.

BRIGANCE, WILLIAM N. *Speech: Its Techniques and Disciplines in a Free Society*. New York: Appleton-Century-Crofts, 1952. Pp. 601. $4.00.

BURKET, LESTER W. *Oral Medicine*. Philadelphia: J. B. Lippincott Co., 1952. (2nd ed.) Pp. 575. $14.00.

BYCHOWSKI, GUSTAV AND DESPERT, JULIETTE L., eds. *Specialized Techniques in Psychotherapy*. New York: Basic Books, 1952. Pp. 383. $5.00.

CARVER, GEORGE A. JR. *Aesthetics and the Problem of Meaning*. New Haven, Conn.: Yale Univ. Press, 1952. Pp. 99. $2.50.

CHESSER, EUSTACE. *Cruelty to Children*. New York: Philosophical Library, 1952. Pp. 159. $3.75.

CUCCIA, C. LOUIS. *Harmonics, Sidebands, and Transients in Communication Engineering, as Studied by the Fourier and Laplace Analyses*. New York: McGraw-Hill Book Co., 1952. Pp. 474. $9.00.

CUTTS, NORMA E. AND MOSELEY, NICHOLAS. *Better Home Discipline*. New York: Appleton-Century-Crofts Co., 1952. Pp. 331. $3.50.

CYRIAX, JAMES. *Textbook of Orthopedic Medicine: Manipulation and Deep Massage*. New York: Harper and Brothers, 1952. (vol. 2, 4th ed.) Pp. 335. $6.00.

DAWES, BEN. *A Hundred Years of Biology*. New York: The Macmillan Co., 1952. Pp. 429. $5.00.

DEDERICH, ROBERT M. *Communication of Technical Information*. New York: Chernonomics, Inc., 1952. Pp. 116. $5.00.

FERGUSON, LEONARD W. *Personality Measurement*. New York: McGraw-Hill Book Co., 1952. Pp. 472. $6.00.

FISCHER, BERCU. *Orthodontics: Diagnosis, Prognosis, Treatment*. Philadelphia: W. B. Saunders Co., 1952. Pp. 334. $12.00.

FLOOD, WALTER E. AND WEST, MICHAEL P. *An Explaining and Pronouncing Dictionary of Scientific and Technical Words*. New York: Longmans, Green and Co., 1952. Pp. 405. $2.25.

FOERSTER, HEINZ VON AND OTHERS, eds. *Cybernetics: Circular Causal and Feedback Mechanisms in Biological and Social Systems*. New York: Josiah Macy, Jr. Foundation, 1952. Pp. 260. $4.00.

FORBUS, WILEY D. *Reaction to Injury*. Baltimore: Williams and Wilkins Co., 1952. (vol. 2) Pp. 1,110. $20.00.

FROSCH, JOHN AND OTHERS, eds. *The Annual Survey of Psychoanalysis: A Comprehensive Survey of Current Psychoanalytic Theory and Practice*. (vol. 1, 1950) New York: International Univ. Press, 1952. Pp. 572. $10.00.

GANS, ROMA AND OTHERS. *Teaching Young Children in Nursery School, Kindergarten, and the Primary Grades*. Yonkers, N. Y.: World Book Co., 1952. Pp. 464. $5.00.

GITTLER, JOSEPH B. *Social Dynamics: Principles and Cases in Introductory Sociology*. New York: McGraw-Hill Book Co., 1952. Pp. 357. $4.00.

GRANT, EVA H. *Parents and Teachers as Partners*. Chicago: Science Research Associates, 1952. Pp. 48. $.40.

GRIFFITHS, WILLIAM. *Behavior Difficulties of Children as Perceived and Judged by Parents, Teachers, and Children Themselves*. (Inst. of Child Welfare Monogr. no. 25) Minneapolis: Univ. of Minnesota Press, 1952. Pp. 128. $3.00.

GUILFORD, JAY P. *General Psychology*. New York: D. Van Nostrand Co., 1952. (2nd ed.) Pp. 599. $5.00.

HAGOOD, MARGARET J. AND PRICE, DANIEL O. *Statistics for Sociologists*. New York: Henry Holt and Co., 1952. (Rev. ed.) Pp. 586. $5.75.

HAHN, ELISE AND OTHERS. *Basic Voice Training for Speech*. New York: McGraw-Hill Book Co., 1952. Pp. 262. $4.00.

HALL, I. SIMPSON. *Diseases of the Nose, Throat, and Ear*. Baltimore: Williams and Wilkins Co., 1952. (5th ed.) Pp. 463. $4.00.

HAVIGHURST, ROBERT J. AND OTHERS. *Are the Community and the School Failing the Unusual Child?* (NBC Radio Discussion Transcript No. 735) Chicago: Univ. of Chicago Round Table, 1952. Pp. 33. $.10.

HIRSH, IRA J. *The Measurement of Hearing.* New York: McGraw-Hill Book Co., 1952. Pp. 364. $6.00.

KUHLEN, RAYMOND G. AND THOMPSON, GEORGE G., eds. *Psychological Studies of Human Development.* New York: Appleton-Century-Crofts Co., 1952. Pp. 533. $3.50.

LEOPOLD, WERNER F. *Bibliography of Child Language.* (Northwestern Univ. Studies, Humanity Ser. No. 28) Evanston, Ill.: Northwestern Univ. Press, 1952. Pp. 120. $2.00.

LEVINE, S. Z. *Advances in Pediatrics.* (vol. 5) Chicago: Year Book Publishers, 1952. Pp. 273. $7.00.

LINSKY, LEONARD, ed. *Semantics and the Philosophy of Language: A Collection of Readings.* Urbana, Ill.: Univ. of Illinois Press, 1952. Pp. 298. $3.75.

MELVIN, ARTHUR G. *General Methods of Teaching.* New York: McGraw-Hill Book Co., 1952. Pp. 259. $3.75.

MILLER, ELVENA. *Is Your Child Beginning to Stutter?* Seattle: Seattle Public Schools, 1952. Pp. 23. $.50.

MUNRO, DONALD. *The Treatment of Injuries to the Nervous System.* Philadelphia: W. B. Saunders Co., 1952. Pp. 284. $7.50.

MURSELL, JAMES L. *Psychology for Modern Education.* New York: W. W. Norton and Co., 1952. Pp. 620. $3.90.

OSBORN, LESLIE A. *Psychiatry and Medicine: An Introduction to Personalized Medicine.* New York: McGraw-Hill Book Co., 1952. Pp. 508. $7.50.

OVERSTREET, HARRY A. *The Great Enterprise: Relating Ourselves to Our World.* New York: W. W. Norton and Co., 1952. Pp. 332. $3.50.

Psychological Problems of Cerebral Palsy: A Symposium. Chicago: The National Society for Crippled Children and Adults, Inc., 1952. Pp. 79. $1.25.

SILVERBERG, WILLIAM V. *Childhood Experience and Personal Destiny: A Psychoanalytic Theory of Neurosis.* New York: Springer Publishing Co., 1952. Pp. 304. $4.50.

SLOBODY, LAWRENCE B. *Survey of Clinical Pediatrics.* New York: McGraw-Hill Book Co., 1952. Pp. 480. $7.50.

SPEAR, MARY E. *Charting Statistics.* New York: McGraw-Hill Book Co., 1952. Pp. 265. $4.50.

STEVENSON, JOHN. *Obsolete American Mental Health Systems.* New York: Pageant Press, 1952. Pp. 228. $3.00.

SWANSON, GUY E. AND OTHERS, eds. *Readings in Social Psychology.* New York: Henry Holt and Co., 1952. Pp. 699. $5.00.

THURSTONE, LOUIS L., ed. *Applications of Psychology: Essays to Honor Walter V. Bingham.* New York: Harper and Brothers, 1952. Pp. 219. $3.00.

VICTOR, FRANK. *Handwriting: A Personality Projection.* Springfield, Ill.: Charles C. Thomas, 1952. Pp. 168. $3.75.

VINACKE, WILLIAM E. *The Psychology of Thinking.* New York: McGraw-Hill Book Co., 1952. Pp. 405. $5.50.

WALLS, GORDON L. AND MATHEWS, RAVENNA W. *New Means of Studying Color Blindness and Normal Foveal Color Vision.* Berkeley: Univ. of California Press, 1952. Pp. 176. $2.50.

WASHBURNE, CARLETON W. *What Is Progressive Education?* New York: The John Day Co., 1952. Pp. 155. $2.50.

WESTLAKE, HAROLD. *A System for Developing Speech with Cerebral Palsied Children.* Chicago: National Society for Crippled Children and Adults, Inc., 1952. Pp. 15. $.25.

WHITE, JAMES C. AND OTHERS. *The Autonomic Nervous System: Physiology and Surgical Application.* New York: The Macmillan Co., 1952. (3rd ed.) Pp. 591. $12.00.

WIENER, MEYER AND OTHERS. *Progress in Ophthalmology and Otolaryngology.* New York: Grune and Stratton, 1952. Pp. 666. $15.00.

WINSTANLEY, J. W. *Textbook on Sound.* New York: Longmans, Green and Co., 1952. Pp. 250. $2.60.

WITHERINGTON, HENRY C. *Educational Psychology.* Boston: Ginn and Co., 1952. (Rev. ed.) Pp. 492. $4.00.

WOODS SCHOOL. *Helping Parents Understand the Exceptional Child.* (Proceedings of the Annual Spring Conference under the Auspices of the Child Research Clinic) Langhorne, Pa.: The Woods School, 1952. Pp. 42. (Gratis)

Abstracts

SANFORD, F. (ed.) Discussion on ethics. *Amer. Psychologist*, 7, 1952, 425-455.

A summary of the rationale and procedures through which various committees of the American Psychological Association have evolved a code of ethics for consideration for adoption at the APA meetings in September, 1952. There is included a number of provocative statements by prominent psychologists and the complete text of the code of ethics drawn up by the New York State Psychological Association. *(J.V.F.)*

BAKER, E. AND SOKOLOFF, M. Teaching aphasic patients to talk again. *Amer. J. Nurs.*, 52, 1952, 831-832.

A brief discussion of the nature of aphasia and some of the usual therapeutic methods employed in helping the patient regain his language functions. *(J.V.F.)*

DREIKIUS, R., SHULMAN, B. AND MOSAK, H. Patient-therapist relationship in multiple psychotherapy. *Psychiat. Quart.*, 26, 1952, 219-227.

Multiple psychotherapy (several therapists treat a single patient) is compared with individual psychotherapy. Authors conclude that the former shows significant advantages in facilitating therapy and in decreasing the chances of error. *(C.F.D.)*

Abstracts is edited by Eugene T. McDonald, Pennsylvania State College, assisted by the following committee: Asa J. Berlin, Pennsylvania State College; Charles F. Diehl, University of Kentucky; James V. Frick, Pennsylvania State College; Lester L. Hale, University of Florida; Frank M. Lassman, University of Minnesota; Jack Matthews, University of Pittsburgh; Sylvia O. Richardson, Children's Medical Center, Boston, Mass.; Hildred M. Schuell, Veterans Hospital, Minneapolis, Minn.; D. C. Spriestersbach, State University of Iowa; Jesse J. Villarreal, University of Texas; Charlotte G. Wells, University of Missouri. The committee systematically reviews 203 journals for articles of interest to members of ASHA. With this issue, Dr. McDonald is retiring as Assistant Editor in charge of Abstracts and will be replaced by Jack Matthews.

CLARK, E. G. Buddy's operation. *Understanding the Child*, 20, 1951, 119-121.

It is the opinion of the author, a registered nurse, that no one frightening experience is quite so generally inflicted on children as the tonsil operation. She tells the story of Buddy's operation as a 'means of obviating the psychic trauma that often attends the pre- and post-operative periods.' It is suggested that the story be read on several occasions before the date of surgery so the child may have the outlet for any tension by means of dramatizing the event. *(L.L.H.)*

WEIDER, A., NOLLER, P. AND SCHRAMM, T. The Wechsler Intelligence Scale for Children and the Revised Stanford Binet. *J. consult. Psychol.*, 15, 1951, 330-333.

The Wechsler Intelligence Scale for Children and Form L of the Revised Stanford Binet Intelligence Scale were administered to 106 white Louisville children between 5 years 0 months and 11 years 11 months in age. Obtained scores were correlated for a younger group (5-0 through 7-11) and an older group (8-0 through 11-11). Mean scores, equivalent scores derived from the regression equation, and a provisional table of equivalent scores for the prediction of the WISC IQ from the Binet IQ were given.

The coefficients of correlation for all subjects were as follows: full scale WISC IQ and Binet IQ, 89 ± .02; WISC verbal scale and Binet IQ .89 ± .02; and the WISC performance scale and Binet IQ, .77 ± .04. Binet IQ's tended to be higher than WISC IQ's for the same children.

The authors suggest that the WISC is a more interesting test for children than the Binet, and in addition possesses psychodiagnostic qualities which recommend it for clinical use. *(H.M.S.)*

ZUBEK, J. P. Recent electrophysiological studies of the cerebral cortex: implications for localization of sensory functions. *Canad. J. Psychol.*, 5, 1951, 110-121.

This paper points up the role of electrophysiological studies of the cortex in study-

ing the problem of localization of sensory functions. The author compares selected maps of the sensory areas of the cortex obtained by the above types of studies to those obtained by anatomical methods and suggests that the former maps are better guides to the cortical areas important in psychological functions than are the latter. (*D.C.S.*)

Moran, R. E. and Castro, A. F. The superior laryngeal nerve in thyroid surgery. *Ann. Surg.*, 134, 1951, 1018-1021.

The authors state that it is well known that hoarseness and difficulty in breathing following thyroidectomy may be a result of edema, pressure or section of the recurrent laryngeal nerve. The cases reported here are in a group by themselves; usually the laryngoscopic examination has been called normal, and yet the patient has a definite change in the tone of the voice. The fact is brought out that in some cases injury to the external branch of the superior laryngeal nerve at the time of ligation of the superior pole of the thyroid gland during thyroidectomy can be responsible for a definite change in the quality of voice. Unilateral trauma resulted in a hoarse and monotonous voice. Bilateral trauma to the external branch showed the same change in voice plus the added factor of easy fatigability. (*G.M.P.*)

Spiegel, E. A., Wycis, H. T., Freed, H. and Orchinik, C. The central mechanism of the emotions (experiences with circumscribed thalamic lesions). *Amer. J. Psychiat.*, 108, 1951, 426-432.

This study attempts to correlate with definite anatomical structure the central mechanism upon which emotions depend. The material consists of 58 cases in which lesions of various thalamic nuclei and combinations of such lesions were produced. It was concluded that it was not possible to refer emotional reactions to a single circumscribed nucleus within the diencephalon or to its connections with the frontal lobes, but that there exists a multiple representation of this function. Following the elimination of one or two of these circuits others are able to compensate for the loss. As far as the present experience permits localizing this function, the circuits that seem to play a part are enumerated. (*G.M.P.*)

Conley, J. J. Treatment of the tumors of the inferior alveolus and the mandible. *Ann. Otol., etc., St Louis*, 61, 1952, 62-82.

Brief discussions are given of incidence, embryology, etiology, classification, pathology, symptomatology, morbid anatomy, clinical course, and diagnosis of tumors of the mandible and inferior alveolus. The surgical treatment is described in greater detail with drawings of operative stages. Reparative and reconstructive phases are given attention including mandibular restoration through bone graft and oral prosthesis. A bibliography is appended, 35 items. (*F.M.L.*)

Arnot, R. A theory of frontal lobe function. *Arch. Neurol. Psychiat.*, 67, 1952, 487-495.

Observations of 400 lobotomy patients, 300 of whom were seen both before and after surgery, are discussed. Reduction of the following forms of behavior was noted: refusal of food, fear, worry, depression, lack of cooperation, destructiveness, resistiveness, and combativeness. Undesirable sequelae were excessive appetite, outspokenness, and lack of initiative. The author explains these changes in behavior on the basis of reduction of a persistence function of the frontal lobes and their connections, which serves to maintain emotional states, chains of thoughts, motor actions, and inhibitions. (*H.M.S.*)

Spriestersbach, D. and Curtis, J. Misarticulation and discrimination of speech sounds. *Quart. J. Speech*, 37, 1951, 483-491.

This study questions the validity of the assumptions that: (1) an individual found to have a defective sound consistently misarticulates the sound in all phonetic contexts and in all kinds of speaking situations; and (2) treatment should invariably follow the pattern of ear training, then production of the sound in isolation, in nonsense syllables, in words and sentences, and finally in a series of increasingly difficult speaking situations.

The authors, on the basis of an analysis of related research data previously reported, tentatively postulate that since there appears to be no position consistency in the misarticulation of speech sounds among individuals, a need exists for a detailed testing of any defective sound in all phonetic contexts. Retraining, it seems, might be facilitated by utilizing phonetic contexts in

which the individual consistently articulates the sound correctly. Ear training adapted entirely to phonetic contexts in which errors occur is suggested. (*C.F.D.*)

PERKINS, W. H. Methods and materials for testing articulation of [s] and [z]. *Quart. J. Speech*, 38, 1951, 57-62.

In an effort to obtain additional evidence for formulating an ideal test for diagnosing articulation defects, the author tested 44 grade school children and 12 adults having only a deviant [s] or [z]. The test material consisted of 49 single words and 19 sentences plus supplementary material for combinations not achieved by the basic formula. The material tested initial [s] and [z] in 15 combinations, final [s] and [z] in 28 combinations, and medial [s] and [z] in 48 combinations.

On the basis of the results the author postulates: (1) that certain positions of [s] or [z] in a word or word group and certain sound combinations with [s] and [z] influence the ease with which the sounds can be produced, (2) that if these findings are typical a short test appears to be capable of disclosing as many errors as a long test, (3) that sound combinations appear to be more influential than the position of the sound, (4) that age does not seem to be a factor in type of error produced, (5) that verbal imitations appear to provide practically the same results as spontaneous responses, and (6) that neither the number of errors nor the type of error recur consistently. (*C.F.D.*)

SMITH, K. AND WEHRKAMP, R. A universal motion analyzer applied to psychomotor performance. *Science*, 113, 1951, 242-244.

Apparatus is described which has been designed to provide (a) automatic registration of elapsed time in the performance of any simple or complex motor task, (b) separate automatic registration of the different components of travel time and manipulation, or time involved in the task, and (c) flexibility and universality of application of the analytic method to different types of task situations. (*A.J.B.*)

PIERCE, J. Communication theory. *Phys. Today*, 4(5), 1951, 6-12.

The author, a member of the Bell telephone Laboratories staff, tells how problems of communication may be better approached through use of the communication theory developed by such men as Shannon, Wiener, and Tuller. He gives a number of examples showing how such a theory 'makes work easier, cheaper, and more thorough. It helps the engineer in several ways. First, it tells him what is possible and what is not possible. . . Secondly, it is only when one has some sort of general theory that he can correctly evaluate his achievement. . . Finally, when one has general and quantitative knowledge of a field (that is, when he has a mathematical theory) he can strip problems of irrelevant detail, turn them over in his mind, and find new things that it must be possible to do, granted enough cleverness and inventiveness.' (*J.V.F.*)

MASON, H. AND GARRISON, B. Intelligibility of spoken messages: liked and disliked. *J. abnorm. soc. Psychol.*, 46, 1951, 100-103.

'Liked' and 'disliked' messages were transcribed from wire recorded high noise-to-signal material. 'Liked' messages were transcribed more accurately but familiarity with message idea seemed dominant in transcription accuracy. (*C.R.E.*)

CORSO, J. The neural quantum in discrimination of pitch and loudness. *Amer. J. Psychol.*, 64, 1951, 350-368.

The neural quantum theory of pitch and loudness discrimination was investigated through the use of two groups for each function with customary discrimination methodology. Least squares analysis of the data failed to support the predictions of the theory. (*C.R.E.*)

DICKSON, E. D. D. AND CHADWICK, D. L. Observations on disturbances of equilibrium and other symptoms induced by jet-engine noise. *J. Laryng.*, 65, 1951, 154-165.

A description is given of dizziness, unsteadiness, and several mental effects of exposure to turbo-jet engine noise. The literature is summarized and the possibility of the Tullio phenomenon (stimulation of the cristæ of the semi-circular canals by high intensity noise) is raised. Spectrum analyses show the noise rising to 120-130 db in the 2-4000 cycle range, and dropping off to 70-80 db in the ultra-sonic range. Relationship to the resonant frequency of the external auditory canal is discussed. Cavitation is mentioned as a possible etiology of acoustic trauma. Apparently the intensity of the noise is of more importance in producing the effects than is the frequency. (*L.G.D.*)

SHAMBAUGH, G. E., Effects of noise on the ear and hearing. *Hearing News*, 19 (11), 1951, 1-2, 20-22.

The differences between auditory fatigue and noise deafness are discussed. The site of injury is believed to be in the hair cells of the Organ of Corti. Reversible auditory fatigue and irreversible noise deafness are influenced by the following factors: (1) individual susceptibility of the ear, (2) intensity of the noise, (3) duration of the noise, (4) pitch of the noise, (5) suddenness of the noise, (6) vulnerability of the 4,000 cycles range, (7) noises in excess of 90 db.

Since there is no known curative measure for hair cell restoration, it is important to encourage prevention of the problem, particularly in the light of increased mechanization of industry and of war.

A leaflet has been prepared by the Committee on the Conservation of Hearing of the American Academy of Ophthalmology and Otololaryngology to acquaint industry with the problem and to offer measures which can be taken to prevent noise deafness. *(A.J.B.)*

DRAEGERT, G. L. Relationships between voice variables and speech intelligibility in high level noise. *Speech Monogr.*, 28, 1951, 272-278.

Eighty-eight male undergraduate university students were selected from a population of 555 male students for this study. The subjects represented the upper and lower extremes of the population with reference to their intelligibility in high level noise. Data on most of the voice variables were obtained from analyses of the recordings of the subjects' reading of a VCL test list of 24 words and a phonetically treated paragraph. Study was made of the relationships existing between the various intelligibility scores and the following measures: mean syllable duration in seconds, mean syllable intensity, intensity variability, mean fundamental pitch, and the harmonic structure factor of the reading of the word list; rate of words per minute, proportion of speech time, mean syllable duration in seconds, mean syllable intensity, and intensity variability of the reading of the prose passage; sustained phonation in seconds; and vital capacity.

'Results obtained from this investigation suggest that training for a high degree of syllable intensity accompanying prolonged syllables may be most effective in training for improved intelligibility. If talkers using a communication system in high level noise achieve increased syllable intensity and duration they probably will have improved their chances of being understood correctly.' *(D.C.S.)*

BUTTERWORTH, A. T. Acceptance in the therapeutic situation. *Psychiat. Quart.*, 26, 1952, 433-438.

The meaning of acceptance and the role of acceptance in psychotherapeutic relationships is discussed. *(C.F.D.)*

MORLEY, D. The speech-handicapped adult. *J. Rehabilit.*, 18(3), 1952, 16-18, 26-27.

Written for the rehabilitation worker, the author discusses categories of speech defects, available referral agencies, factors affecting prognosis, and the employment outlook for the speech-handicapped adult. *(J.V.F.)*

DOLPHIN, J. E. AND CRUICKSHANK, W. M. Tactual motor perception of children with cerebral palsy. *J. Personality*, 20, 1952, 466-471.

A group of 30 cerebral palsied children were matched in chronological age and mental age with 30 physically normal children. A tactual motor test was given to both groups. Three figures, a square, an oval, and a triangle, were presented on two sets of boards. On the first set the background was flat and smooth; on the second set the background was composed of flat enamelled thumbtacks. With the boards shielded from sight, the subject was asked to explore the surface with his hands and then make a drawing of what he had perceived.

The findings indicate that the cerebral palsied children were not as adept as the normal children in differentiating the figure from the background. The difference in responses of the two groups in differentiating figure from background was much greater than when the background was structurally insignificant. *(D.C.S.)*

DOLL, E. Mental evaluation of children with cerebral palsy. *Crippled Child*, 30(1), 1952, 6-7, 28.

The author labels the search for *a* test for cerebral palsy as 'ingenuous' and takes the position that '. . . we should view the child with cerebral palsy as a person as well as a patient. In evaluating his mental capabilities, we must first reckon with his physical disabilities. Hence adequate psychological appraisal must find ways of "by-passing" his

receptive and expressive handicaps in order to reveal the true capacities which may be obscured or distorted by sensory or motor impairments. When this is done, both assets and deficits may be explored as in the total assay of any person, whether infant, child, youth or adult.' *(J.V.F.)*

SATALOFF, J. AND FRASER, M. Hearing loss in children with cleft palates. *Arch. Otolaryng., Chicago,* 55, 1952, 61-64.

Preliminary study of 30 children with cleft palates reveals middle ear pathology and conductive hearing impairment in the majority. To prevent some middle ear complications due to hypertrophied adenoids, adenoidectomy is suggested, preferably at time of first cleft palate surgery. Tonsillectomy should be delayed until age 6, if possible. *(F.M.L.)*

GUILFORD, F. R. AND HAUG, C. O. Diagnosis of deafness in the very young child. *Arch. Otolaryng., Chicago,* 55, 1952, 101-106.

The use of the Pediacoumeter in testing the hearing of young children is described. Critical discussion is appended. *(F.M.L.)*

BROWN, H. A., LOVE, J. G. AND ADAMS, N. D. Otologic evaluation of unilateral acoustic neurofibroma: review of 150 cases. *Laryngoscope,* 62, 1952, 250-261.

The authors review 150 cases of unilateral acoustic neurofibroma in which diagnosis was confirmed by microscopic examination of tissue after surgery. Some degree of deafness was found in all cases, usually complete or severe. But occasionally only mild impairment resulted. In all instances of mild auditory impairment, labyrinthine function was more severely impaired than cochlear function. Signs and symptoms other than 8th nerve type are discussed. *(F.M.L.)*

JONES, J. AND DINOLT, R. Pure word deafness. *Laryngoscope,* 62, 1952, 194-203.

Subcortical sensory aphasia or pure word deafness is discussed with a review of opinions regarding causation. A patient who suffered a left-sided stroke seven years previous is described. His second cerebral accident resulted in isolated preword deafness. Otologic studies reveal satisfactory hearing and undisturbed language expression. Possible foci for the lesion are discussed. *(F.M.L.)*

RISKAER, N. Response of otosclerosis and adhesive otitis to treatment with corticotropin. *Arch. Otolaryng., Chicago,* 55, 1952, 343-349.

Twelve otosclerotics, two patients with adhesive otitis, and one aplasia auris congenita were given short course treatment with ACTH. Ears with long standing pathology and fenestrated ears with postoperative failure did not respond favorably. *(F.M.L.)*

JUERS, A. L., DERLACKI, E. L. AND SHAMBAUGH, G. E. Chronic progressive deafness, including otosclerosis and diseases of the inner ear. *Arch. Otolaryng., Chicago,* 55, 1952, 218-233.

Summaries of bibliographical material on progressive deafness published in 1949 are given. Reviewers' comments are interspersed. *(F.M.L.)*

LEMPERT, J., MELTZER, P. E., WEVER, E. G., LAWRENCE, M. AND RAMBO, J. H. T. Structure and function of the cochlear aqueduct. *Arch. Otolaryng., Chicago,* 55, 1952, 134-145.

Structural investigations are reviewed to indicate a fairly wide lumen through the cochlear aqueduct in lower animals, but only a very narrow although continuous lumen in primates. Fluid pressure is transferable through the aqueduct but is under great frictional resistance in the primates.

Physical and chemical composition of perilymph and cerebrospinal fluid show many similarities and only slight differences, but similarities do not necessarily mean a common source. Another possible explanation could be secretion in different places by similar tissues.

Injection experiments were conducted on seven monkeys. An aqueous suspension of colloidal carbon was injected into the cisterna magna and the perilymph was inspected after periods from 20 minutes to seven days had elapsed. Injections were also made under pressure. Little or no penetration of the aqueduct resulted. The explanation offered was (1) the minute size and great resistance of the lumen, and (2) the fact that the cochlea is already filled. The possibility is raised that the cochlear aqueduct has no specific function but is merely vestigial. *(F.M.L.)*

LAWRENCE, M. AND WEVER, E. G. Effects of oxygen deprivation upon the structure of the organ of corti. *Arch. Otolaryng., Chicago,* 55, 1952, 31-37.

In earlier studies it was found that ex-

treme oxygen deprivation diminished the electrical potentials generated by the cochlea under sound stimulation. The deterioration of cochlear potentials due to anoxia seemed to be independent of frequency.

Of the animals used in the previous experiment, four were brought to final histological study. Although in different states of anoxia when fixed, the general picture of degeneration was much the same when the animals were compared. Every ear showed progressive degenerative stages of the cochlea and differed only in that the animals exposed to most extreme anoxia showed most extreme stages of degeneration.

The basal end of the cochlea showed more deterioration than the apical end but otherwise the pattern was irregular. Some areas of the organ of corti showed more degeneration than areas immediately adjacent. The stria vascularis also varied from almost normal to a condition of complete degeneration but the state of the stria had no relation to the state of the organ of corti in the immediate vicinity. The supporting cells succumbed first whereas the hair cells maintained well into the later stages of the degeneration. In certain regions the hair cells were considerably more degenerated than in other areas, yet the same degree of cochlear potential impairment was observed for all frequencies. *(F.M.L.)*

ADAMS, L. A. Closure of tympanic membrane perforations by trichloroacetic acid cauterization. *Arch. Otolaryng., Chicago,* 55, 1952, 38-42.

Twelve perforations were treated by destruction of their epithelial lining with trichloroacetic acid. A rationale for this treatment is developed and the technique is detailed. Permanent closure of 10 perforations resulted, with 2 failing to close and one subsequent rupture observed. Audiometric study showed markedly improved or near normal hearing acuity in every instance where closure was obtained. *(F.M.L.)*

TIFFANY, W. R. AND HANLEY, C. N. Delayed speech feed-back as a test for auditory malingering. *Science,* 115, 1952, 59-60.

Report of a study measuring the change in reading time when a delayed side tone of approximately .14 seconds is presented at 35 db, 55 db, and 75 db. In all conditions there was significant slowing of the speech rate, the magnitude of the retardation increasing with increased intensity of feedback.

A single case of psychogenic deafness reacting reliably to her own speech on feedback is reported. It is suggested that the use of the feedback speech phenomenon is feasible in the detection of malingering or psychogenic deafness. *(A.J.B.)*

SENTURIA, B. H. AND MARCUS, M. D. Etiologic classification of diseases involving the external ear. *Ann. Otol., etc., St Louis,* 61, 1952, 18-32.

Succinct descriptions given of external ear diseases with special attention devoted to causation. Forty-three bibliographical references. *(F.M.L.)*

ORMEROD, F. C. The use and limitation of hearing aids. *Practitioner,* 167, 1951, 504-509.

The title is somewhat misleading since this is actually a discussion of the provisions of the National Health Act in the United Kingdom and individuals with hearing loss. Brief mention is made of the numbers of deaf individuals in the United Kingdom according to a survey in 1947, examination and testing of candidates for the issue of an aid and the supply of Medresco aids according to the provisions of the National Health Act. There is an excellent discussion of the way in which England has tried to meet the needs of the deaf by the free issue of a hearing aid. Any person, certified by an otologist to require one, is followed by free service and re-supply of batteries. *(S.O.R.)*

Practitioner, 167, 1951, 475-514.

This issue is devoted chiefly to diseases of the ear. It includes articles on 'The treatment of acute otitis media,' 'Infections of the outer ear,' 'Problems of the chronic running ear,' and 'The treatment of otosclerosis.' These are medical articles, but worth reading to the individual working with the hard of hearing. *(S.O.R.)*

News And Announcements

The State University Teachers College at New Paltz, New York is developing a Speech and Hearing Clinic under the direction of Dr. Perry E. Baisler, to serve the area between New York City and Albany.

Children and adults in Alabama who have problems associated with cleft lip and palate are now being seen at monthly clinics held at the University of Alabama Dental College in Birmingham. These clinics are being sponsored by the Speech Department, Medical College, and Dental College of the University, State Crippled Children's Service, State Crippled Children's Society, and Vocational Rehabilitation.

Several projects have been under way in Arkansas. A six-weeks speech correction workshop was held at the University of Arkansas this summer. Nine scholarships to the workshop were provided by the Special Education Section of the Arkansas Department of Education. A two-weeks intensive speech correction workshop was held during the summer at Arkansas A. and M. College. The workshop was under the direction of Mrs. Joanna Davis of Little Rock. A course in speech correction for the classroom teacher was held for the first time at Ouachita College. This course is to be continued, and was taught by Mrs. Lei a Shaw of the Ouachita speech staff. Henderson State Teachers College, Arkansas State Teachers College and Arkansas Polytechnic Institute carried on their regular speech correction programs during the summer. The Arkansas Chapter of the International Council for Exceptional Children met in Little Rock to organize local Chapters in the state. A series of city and county teacher workshops was sponsored, with sections devoted to speech correction.

News And Announcements is edited by Charles R. Elliott, Northwestern University, assisted by the following committee: Jane Beasley, University of Alabama; George Gens, Newark (New Jersey) State Teacher's College; Elise Hahn, University of California at Los Angeles; Earl Schubert, State University of Iowa.

George W. Kisker, Associate Professor of Psychology at the University of Cincinnati, is engaged in making tape recordings of lectures and discussions by psychologists and psychiatrists in universities throughout the country. These are re-recorded on tape, standard 78 rpm, or long-play phonograph records as required. Negotiations are under way for the recording of lectures at universities throughout the world and the plan includes the adding of various areas of learning to the library.

Full information concerning Public Health Research Grants can be obtained by writing to Division 66, Research Grants, Bethesda 14, Maryland.

Edward L. Johnstone has been elected President of the Woods Schools for exceptional children at Langhorne, Pennsylvania.

Alfred Sasser, Jr. has been appointed as consultant in employment for the National Society for Crippled Children and Adults. Mr. Sasser replaces Edward L. Morris, who recently became Director of Chicago's Portal House. Mr. Sasser will direct the Society's National Personnel Registry and Employment Service.

Tulane University has opened a Speech and Hearing Clinic in the Department of Otolaryngology of the School of Medicine, at New Orleans, La. It is under the direction of James W. McLaurin, M.D., otolaryngologist, and Jeannette K. Laguaite, Ph.D., speech pathologist.

Application forms for fellowships from the National Science Foundation are available from the Foundation, Washington 5, D. C. They must be returned by January 5. Most of the 600 awards are made to graduate students, a few are made to post-doctoral students.

The Tennessee Department of Public Health has added a Speech and Hearing Program in its Crippled Children's Service. The program is designed to include case-

finding, medical services for the indigent and services of speech and hearing clinics. William C. Geer is Assistant Service Director in charge of Speech and Hearing. Eight consultants in speech and hearing conduct testing programs, assist in plastic and ear, nose and throat clinics and assist with in-service training programs.

The University of Kansas Medical Center has expanded its program in speech and hearing. The Department of Hearing and Speech now offers a one-year graduate training program for teachers of the deaf and has completed plans for one full semester of graduate work, in conjunction with the University of Kansas in Lawrence, toward the Master of Science degree with a major in speech correction. Funds for the new Hospital School for Children with Cerebral Palsy are now being raised by the '40 & 8' of the American Legion in Kansas. This new school will also house the Preschool for the Deaf, the cleft palate rehabilitation program, and an out-patient clinic for speech and hearing problems. Miss June Miller is Director of the Speech and Hearing Department.

The University of Illinois has established an Institute for Research on Exceptional Children, in cooperation with the Illinois Departments of Public Welfare and Public Instruction. The Institute program will provide training for research workers, and through its research activities improve the effectiveness of the work of both public and private agencies.

Mundelein College in Chicago is establishing a speech clinic and offering a Saturday course in speech correction for the classroom teacher. Service in the clinic will be aimed at the elementary and secondary school population in the Chicago area.

A one-day workshop was given by Wendell Johnson at Northwestern University on October 11, 1952. The topic was, 'A Review of the Evidence on Which My Present Theories of Stuttering are Based.'

A symposium on Speech Problems of School Children was held on the opening day of the American Psychological Association Meetings in Washington, D. C. in September. The symposium was sponsored by the Division of School Psychologists and the Division of Educational Psychology of the A.P.A., the American Speech and Hearing Association and the National Society for Crippled Children and Adults.

Meetings Announced

Speech Association of America, December 29-31, Netherland-Plaza Hotel, Cincinnati, Ohio.

American Association for the Advancement of Science, December 26-31, St. Louis, Missouri.

Acoustical Society of America, Atlantic City, N. J., May 7-9, 1953.

American Association for Cleft Palate Rehabilitation, 1953—Atlanta, Georgia; 1954—Eastern Seaboard; 1955—Iowa City, Iowa.

American Psychological Association, September 4-9, Michigan State College, East Lansing, Michigan.

Annual Reading Institute of Temple University, February 2-6, 1953. Sponsored by Reading Clinic, Department of Psychology, Temple University, Philadelphia 22, Pennsylvania.

New Materials

A new children's magazine for ages three through seven, called *Humpty Dumpty's Magazine*, began publication in the fall. Editorial offices are at 52 Vanderbilt Avenue, New York 17, N. Y.

Audio-Educators of Kenilworth, Illinois are introducing *Teaching Tapes*. These 15- to 30-minute tapes are 'custom built' for classroom use, cover the range of grade school through college, and are produced by educational leaders and platform artists in many fields. Tapes are now available in more than nine fields and others are to be added regularly.

Services for Crippled Children is a new Government booklet, 27 pages, 15 cents, from the Supt. of Documents, Washington, D. C. This booklet describes the various services offered.

The Woods Schools of Langhorne, Pa. offers gratis the proceedings of the annual Spring Conference on Education and the

Exceptional Child, *Helping Parents Understand the Exceptional Child.*

The Psychological Corporation, 522 Fifth Avenue, New York 36, N. Y., offers a new kit designed for specialists in the study of child play. The *Driscoll Play Kit* furnishes an apartment of five rooms, complete with furniture and dolls, in a carrying case as a practical standard set of equipment for the systematic study of child play.

Magnetic recording on two tracks is provided in a new movie recorder-projector using an 8-mm track. Weight is only 35 pounds and a special device is utilized to minimize flutter. Movie-Mite Corporation, 1116 Truman Road, Kansas City 6, Mo.

A new binaural tape recorder is announced in the *Synchrotone* by Magnetic Recording Industries, 30 Broad St., New York 4, N. Y. Recording on the two tracks of the same tape may be done simultaneously or at different times and reproduced together, while each track may be erased, dubbed, or altered in intensity or content without disturbing the recording on the other track.

A conventional cone and a horn-type tweeter are utilized by Altec Lansing in their new speaker, offered with a guarantee to have a range of from 30 to 22,000 cps when properly mounted. The 12-inch model 601A, and the 15-inch model 602A have a power handling capacity of 20 watts. Altec Lansing Corporation, 100 Sixth Avenue, New York City.

A flexible cast for patients has been developed by Dewey and Almy Chemical Co., Cambridge, Mass. A thin-walled rubber bag is wrapped in position, air is withdrawn and the bag becomes rigid, holding the patient in position. Cerebral Palsy treatment may lend itself to frequent use of such a device. Re-inflating the bag with air makes the bag flexible again. Tiny plastic granules provide the rigidity base for the bag.

A slide projector weighing less than two pounds and fitting into a top-coat pocket or brief case, yet capable of enlarging two by two slides up to 10 feet is provided in a new miniature projector with a special lens system. Willoughbys, 110 W. 32nd. St., New York 1, N. Y.

Graduate Assistantships, Fellowships and Scholarships

This section, an annual feature of the December issue, lists part-time graduate appointments, fellowship, and scholarships specifically designated for graduate work in speech and hearing. General university fellowships and scholarships, unspecified as to area of concentration, and fulltime graduate positions will not be included. Only those announcements received too late for the December issue are printed in other issues.

Copy should be submitted to the News and Announcements Editor, and should include formal title of appointment, institution, and unit; dates, general duties, and remuneration; name and address of persons receiving applications. Deadline for receiving copy is two months prior to the publication date.

Assistanships. University of Denver. Children's Clinic or Adult Clinic. $600 for nine months. Testing and clinical work. Address Elwood Murray, Director, School of Speech, University of Denver, Denver, Colorado.

Assistantships. Stanford University. Speech and Hearing Clinic. Ten to 20 hours per week. $900 to $1500 depending on hours worked. Clinical work in speech and hearing field. Reduced tuition for holders of assistantships. Address Virgil A. Anderson, Director, Speech and Hearing Clinic, Stanford University, California.

Clinical Assistantships. University of Alabama. Department of Speech, Speech and Hearing Clinic. Starting February or September. Half-time; 20 hours per week of clinical assistance. $1,000 for regular school year; waiver of out-of-state tuition. Students may carry three-fourths normal graduate load. Address T. Earle Johnson, Head, Department of Speech, Box 2025, University, Alabama.

Clinical Assistantships. The Pennsylvania State College. Speech and Hearing Clinic. Starting February or September. Half-time; 20 hours per week. Clinical work with adult vocational rehabilitation clients or college students. $1120 for ten months; remission of tuition. Student expected to enroll for half-time graduate course load, 10 credits per semester. Address Eugene T. McDonald, Speech and Hearing Clinic, The

Pennsylvania State College, State College, Pennsylvania.

Clinical Assistantships. Purdue University. Speech and Hearing Clinic. Starting February or September. Half-time; 20 hours per week of clinical assistance. $1200 for regular school year; waiver of tuition fees. Student may enroll for 10 semester hours of graduate courses. Address M. D. Steer, Speech and Hearing Clinic, Purdue University, West Lafayette, Indiana.

Clinical and Research Assistantships. University of Minnesota. Audiology Clinic, University Hospitals. Starting January or September. Half-time; 20 hours per week; assistance in clinical audiology. $1200 for 11 months; no remission of tuition. Student expected to enroll for two-thirds graduate load. Address Frank M. Lassman, Division of Otolaryngology, E537 University Hospital, University of Minnesota, Minneapolis, Minnesota.

Clinical and Research Assistantships. Ohio State University Department of Speech. Starting June, September, January, March. 15 to 25 hours per week; two-thirds to three-fourths graduate load, $600-$1503 for nine months; exemption from all fees except matriculation, graduation and student union. Address W. Hayes Yeager, Chairman, Department of Speech, The Ohio State University, Columbus 10, Ohio.

Fellowships. University of Denver. Children's Clinic or Adult Clinic. $1200 for nine months; testing and clinical work. Address Elwood Murray, Director, School of Speech, University of Denver, Denver, Colorado.

Fellowships. State University of Iowa. Speech pathology and audiology. Half-time; 20 hours per week. $100 per month; remission of tuition. Fellows allowed to carry 12 semester hours of course work. Applications received any time; must be received by July 1, 1953 to be considered for 1953-54 academic year. Address Wendell Johnson, Speech Clinic, State University of Iowa, Iowa City, Iowa.

Fellowships. University of Wichita (employment in the Institute of Logopedics). Duties primarily clinical. $200 to $250 per month; student is expected to pursue course work toward the M.A. degree. Address Martin F. Palmer, Institute of Logopedics, 2400 Jardine Drive, Wichita 14, Kansas.

Graduate Assistantships. Syracuse University. Hearing and Speech Center. Half-time; 20 hours per week of clinical assistance. $1200 for year; plus waiver of tuition fees. Starting July 1. Student may enroll for nine hours of graduate work. Address Louis M. DiCarlo, Hearing and Speech Center, Syracuse University, 817 University Avenue, Syracuse 10, New York.

Graduate Assistantships. Western Reserve University (granted by the Cleveland Hearing and Speech Center). Half-time; 20 hours per week. $1125, $1250, $1400 per calendar year with three weeks vacation; remission of tuition totalling $480 for maximum load of nine hours per semester. May begin June 15, August 1, and September 1, depending upon training. Applications for the 1953-54 academic year may be made at once. Address George J. Fortune, Director, 11206 Euclid Avenue, Cleveland 6, Ohio.

Graduate Scholarships. Awarded for special study in cerebral palsy by Alpha Chi Omega and the National Society for Crippled Children and Adults. Grants vary between $100 and $750 for a minimum of three months at a recognized training center. Address National Personnel Registry and Employment Service, 11 South LaSalle Street, Chicago 3, Illinois.

Graduate Scholarships. Awarded by the Speech Correction Fund for study at colleges or universities offering training beyond the Master's degree. $500 per year, beginning June or September; applicant must hold the Master's degree, or equivalent, in speech pathology or allied field. Address Mrs. Marceline Jaques, Scholarship Committee, Room 1020, 11 S. LaSalle Street, Chicago 3, Illinois.

Graduate Scholarships. Western Reserve University (Training at the Cleveland Hearing and Speech Center). Remission of $600 full tuition for the academic year. Applications for year beginning September 21, 1953, received at once. Address Director of Admissions, Western Reserve University, 11105 Euclid Avenue, Cleveland 6, Ohio.

Grants-in-aid. The Audiology Foundation. Three types offered: scholarships, research grants, publication grants; to students

already engaged in any branch of audiology or students wishing to enter the field. $500. Applications must originate from educational sponsors. Assurance that the student will continue to work in audiology is necessary. Address The Audiology Foundation, Box 21, Glenview, Illinois.

Internships. University of Michigan Speech improvement camp: Shady Trails. Nine weeks starting June 23, 1953. Clinical work and graduate study at the camp at Northport, Michigan. Six semester hours of graduate credit; room, board, tuition provided. Address John N. Clancy, University of Michigan Speech Clinic, 1007 East Huron St., Ann Arbor, Michigan.

Research Assistantships. Purdue University. The Voice Science Laboratory, Department of Speech. Starting February or September. Half-time; 20 hours per week of laboratory research assistance. $1200 for regular school year; waiver of tuition fees. Student may enroll for 10 semester hours of graduate courses. Address M. D. Steer, Voice Science Laboratory, Department of Speech, Purdue University, West Lafayette, Indiana.

Research Assistantships. Western Reserve University (at the Cleveland Hearing and Speech Center). Starting September 21, 1953. Half-time; 20 hours per week. $800 for nine months; remission of nine hours tuition (maximum load) per semester. Applications for 1953-54 academic year received at once. Address Director of Admissions, Western Reserve University, 11105 Euclid Avenue, Cleveland 6, Ohio.

Research, Clinical and Technical Assistantships. State University of Iowa. Speech pathology and audiology. Starting September 1, 1953. Half-time; 20 hours per week. $900 for nine months; remission of tuition. Assistants allowed to carry 12 semester hours. Applications for academic year 1953-54 received until July 1, 1953. Address Wendell Johnson, Speech Clinic, State University of Iowa, Iowa City, Iowa.

Scholarships. Stanford University. Speech and Hearing Clinic. Student must be in field of audiology. Approximately full tuition granted. No duties. Address Virgil A. Anderson, Director, Speech and Hearing Clinic, Stanford University, California.

Scholarships and Fellowships. Ohio State University, Department of Speech. In audiology. Starting June, September, January, or March. Up to $800 for scholarships and $1,000 for fellowships for academic year; exemption from all fees except matriculation, graduation, and student union. Student carries full graduate load. Address W. Hayes Yeager, Chairman, Department of Speech, The Ohio State University, Columbus 10, Ohio.

Technical Assistantships. University of Alabama. Department of Speech, Hearing Clinic and Recording Laboratory. Starting February or September. Part-time; hours from five to 20 per week; salary determined by type and amount of work. Up to $1,000; waiver of out-of-state tuition. Address T. Earle Johnson, Head, Department of Speech, Box 2025, University, Alabama.

Teaching Assistantships. Purdue University. Department of Speech. Starting February or September. Half-time; 8 hours per week of clinical work and 12 hours teaching duties in required beginning speech course, $1200 for regular school year; waiver of tuition fees. Student may enroll for 10 semester hours of graduate courses. Address A. H. Monroe, Department of Speech, Purdue University, West Lafayette, Indiana.

Teaching Assistantships. Western Reserve University (Granted by the Cleveland Hearing and Speech Center). Starting September 7, 1953, in the nursery for deaf children, ages 16 to 36 months. Half-time; 20 hours per week which includes individual therapy for deaf and severely hard of hearing. $1125 for the calendar year (three weeks vacation) and remission of tuition totaling $480 (nine hours maximum load). Applications for 1953-54 academic year received at once. Address George J. Fortune, Director, 11206 Euclid Avenue, Cleveland 6, Ohio.

Working Scholarships. Western Reserve University (employment at the Cleveland Hearing and Speech Center). Remuneration and working time arranged according to demands for clinical service and needs of student. Applications for the 1953-54 academic year may be made at once. Address George J. Fortune, Director, 11206 Euclid Avenue, Cleveland 6, Ohio.

News About People

Charlene Rooth Zand has been appointed speech therapist at the Institute for the Crippled and Disabled in New York City.

Mrs. John Ricci has been appointed as Field Consultant for the State Service for Crippled Children of the State of Iowa.

Forrest M. Hull, of the teaching staff of the Division of Audiology and Speech Pathology in Vanderbilt University School of Medicine, has been appointed Director of Student Training with the Tennessee Hearing and Speech Foundation.

Perry E. Baisler has accepted a professorship in speech at the State University Teachers College in New Paltz, New York.

Melvin Hyman has been appointed Acting Director of the Speech and Hearing Clinic at Bowling Green State University, Bowling Green, Ohio.

Nancy E. Wood has joined the staff of the Cleveland Hearing and Speech Center, Cleveland, Ohio, and is to serve on the teaching staff of Western Reserve University.

Benjamin Jaques has accepted a position as Director of the Speech and Hearing Clinic of Elmhurst College, Elmhurst, Ill.

Philip J. Glasner has recently been appointed Instructor in Psychiatry at Johns Hopkins University School of Medicine.

Eugene T. McDonald spent three months in the fall on leave from Pennsylvania State College to study problems of cerebral palsy under Dr. Meyer A. Perlstein and other specialists in the Chicago area.

Morris Val Jones has accepted a position as Director of the May T. Morrison Center for Rehabilitation in San Francisco, Calif.

Mary W. Huber has accepted a position as Associate Professor of Speech at Los Angeles State College in California.

Mrs. Marilyn Katzen Harris, Mildred Ann Roth, and Beatrice Odell Woods have been appointed Speech Therapists for the Chicago Public Schools.

Lois Rosignol Mayper has been appointed Director of the Speech Clinic at Children's Hospital in Boston. She replaces Sylvia Onesti Richardson, who has moved to San Diego, California. Mrs. Honora Foster replaces Dr. Richardson as President of the Massachusetts Speech and Hearing Association.

Bernard Schlanger has been appointed Health Education Specialist (Speech Pathologist) in the Division of Mental Hygiene of the State of Wisconsin, and Research Assistant in the Wisconsin Psychiatric Institute, under the University of Wisconsin Medical School.

Margaret C. Byrne has been appointed Assistant Professor of Speech Correction on the staff of the Department of Hearing and Speech of the University of Kansas Medical Center at Kansas City.

Mrs. Rachel Matthews has accepted a position as a teacher in the Preschool for Deaf Children of the Department of Hearing and Speech of the University of Kansas Medical Center at Kansas City.

James S. Earle joined the staff of the Memphis Speech and Hearing Center in September to supervise the speech correction program of the Center.

CONVENTION PROGRAM

November 20-22, 1952, Hotel Statler, Detroit

AMERICAN SPEECH AND HEARING ASSOCIATION

Wednesday, November 19
(pre-convention)

9:00 a.m. Meeting of Executive Council

2.00 p.m. Meeting of Executive Council

7.00 p.m. Meeting of Executive Council

Thursday, November 20

GENERAL SESSION
Presiding: Stanley Ainsworth, Florida State University

8:30 a.m. *Presidential Address.* Harold Westlake, Northwestern University

9:10 a.m. Adjournment

PERSONALITY DEVELOPMENT AND SPEECH THERAPY
Chairman: Jack Matthews, University of Pittsburgh

9:20 a.m. *Personality Portraits and Defective Voice.* Jon Eisenson, Queens College

9:40 a.m. *Self-Percepts of Stutterers Measured by the W-A-Y Technique.* Seymour L. Zelen, Joseph Sheehan, and James F. T. Bugental, University of California, Los Angeles

10:00 a.m. *A Crisis in Language Learning: A Hypothesis Concerning the Nature of Psychogenic Speech Defects.* Gertrud L. Wyatt, Wellesley Public Schools

10:20 a.m. *A Descriptive Study of Some Personality Relationships Underlying a Range of Speaker Confidence, as Determined by the Thematic Apperception Test.* Norman E. Iverson, Southwestern Speech and Hearing Clinic, Temple, Arizona

10:40 a.m. *A Study of the Relationship between Articulatory Disorders and Personality in the Intermediate Grades.* Kenneth Ray Greenberg, University of Pittsburgh

11:00 a.m. Adjournment

SPEECH PATHOLOGIES OF NEUROLOGICAL ORIGIN
Chairman: Mary Huber, Los Angeles State College

9:20 a.m. *A Comparative Study of the Test Responses of Two Groups of Cerebral Palsied Children: Athetoid and Spastic.* Atwood Hudson, Rockford College

9:35 a.m. *Intellectual Functions in Aphasic and Non-Aphasic Brain-injured Subjects.* Ralph M. Reitan, Indiana University Medical Center

9:50 a.m. *Group Therapy with Preschool Cerebral Palsied Children.* Ruth Coffman, University of Alabama

10:05 a.m. *A Reader Devised for the Use of Aphasics.* Marian E. Corbett, Baldwin, Pennsylvania, High School

10:25 a.m. *The Chestnut Hill Clinical Research Center of the United Cerebral Palsy Association.* Martin F. Palmer, Institute of Logopedics

10.40 a.m. Discussion

11:00 a.m. Adjournment

VOICE PROBLEMS

Chairman: Lester Hale, University of Florida

2:30 p.m. *Case Presentation: Hysterical Dysphonia.* Jesse Villarreal, University of Texas
2:45 p.m. Audience Discussion
3:00 p.m. *Case Presentation: Adolescent Voice Change.* Katherine Thorne, University of Buffalo
3:15 p.m. Audience Discussion
3:30 p.m. *Case Presentation: Voice Quality.* Nick Quarto, Western Michigan College of Education
3:45 p.m. Audience Discussion
Discussion Leaders: Claude Kantner, Ohio University
Zelda Horner Kosh, Arlington, Virginia, Public Schools
Kelmer Baxter, University of Illinois
4:00 p.m. Adjournment

RESEARCH IN AUDIOLOGY

Chairman: R. Edwin Shutts, Walter Reed General Hospital

I. Effects of Masking
2:30 p.m. *Masking of Speech by Noise in Impaired Ears.* Charles Lightfoot, Northwestern University
2:45 p.m. *Effect of Noise on Perception of Intensity Changes.* Raymond Carhart, Northwestern University
II. Malingering and Psychogenic Deafness
3:00 p.m. *Use of Psychogalvanic Skin Resistance Test in Cases of Malingering and Psychogenic Hearing Loss.* Josephine Walker, Walter Reed General Hospital
III. Equipment and Materials Adaptable for Use in Public Schools
3:15 p.m. *A New Screening Audiometer for Use in Military Induction Centers.* Aram Glorig, Walter Reed General Hospital
3:30 p.m. *Development of a Film Strip for Use in the Education of Parents and Teachers in Problems of Hearing Loss.* Marion Downs, University of Denver
3:45 p.m. Discussion
4:00 p.m. Adjournment

HOW CAN THE PUBLIC SCHOOL CORRECTIONIST BETTER SERVE THE HARD OF HEARING CHILD?

Chairman: Mary Elizabeth Williams, Oak Park, Illinois, Public Schools

4:00 p.m. *Extent and Nature of the Problem.* Warren H. Gardner, Cleveland Hearing and Speech Center
4:20 p.m. *In-Service Education—Methods of Helping the Classroom Teacher Understand the Hard of Hearing Child.* Milton Eastman, Peoria, Illinois, Public Schools
4:40 p.m. *Aids to Improving the Teaching of Lipreading.* Charles E. A. Moore, Proviso Township High School, Maywood, Illinois
5:00 p.m. *Principles of Auditory Training.* Genevieve Drennan, Illinois Department of Education for Exceptional Children
5:20 p.m. *Integration of Auditory Training with Speech Correction.* Charlotte Wells, University of Missouri
5:30 p.m. Adjournment

LINGUISTIC PROBLEMS IN COMMUNICATION TECHNOLOGY

Chairman: Gordon E. Peterson, Bell Telephone Laboratories

4:00 p.m. *Introduction: Fundamental Systems in Communication Technology.* Gordon E. Peterson, Bell Telephone Laboratories
4:10 p.m. *An Operational Definition of the Phone, the Toneme, and the Phoneme.* Kenneth L. Pike, University of Michigan
4:40 p.m. *A Factor Analysis Study of Speech Perception.* Clair N. Hanley, University of Washington
5:00 p.m. *Sociological and Semantic Factors in the Development of Communication Transmission Systems.* Giles W. Gray, Louisiana State University
5:30 p.m. Adjournment

7:30-9:30 p.m. BUSINESS MEETING OF ASHA MEMBERSHIP
9:30-11:00 p.m. FILM THEATER

7:00-9:00 p.m. Sigma Alpha Eta Executive Council Meeting
10:00-11:00 p.m. Social hour for Sigma Alpha Eta

Friday, November 21

PROBLEMS IN THE ORGANIZATION AND ADMINISTRATION OF PUBLIC SCHOOL SPEECH CORRECTION PROGRAMS
Chairman: Margaret McCausland, Philadelphia Public Schools

8:45 a.m Panel Discussion: *How to Provide for Severe Organic Speech Disorders within the Public School Speech Correction Program.*
Panel Members: Zelda Horner Kosh, Arlington, Virginia, Public Schools
Gladys Fish, Pennsylvania Department of Public Instruction
Jeanette Watkins, Champaign, Illinois, Public Schools and Illinois Office of Public Instruction
Miriam Keslar, Los Angeles Public Schools

10:15 a.m. Adjournment

STRUCTURAL ABNORMALITIES AND SPEECH PROBLEMS
Chairman: Elise Hahn, University of California, Los Angeles

8:45 a.m. *New Therapy for Esophageal Speech.* Robert Milisen, Indiana University

9:00 a.m. *A Comparison of Tongue Flexibility of 19 Children with Cleft Palates and a Control Group with Normal Palates.* Margaret Byrne, University of Kansas Medical School and Jack Matthews, University of Pittsburgh

9:15 a.m. *Suggested Procedures for the Construction and Evaluation of Prosthetic Speech Aids for Cleft Palate Patients.* Harlan Bloomer and Richard Kingery, University of Michigan

9:35 a.m. *Implications of Longitudinal Growth Studies of Cleft Palate New-Borns.* Herbert Koepp Baker and Samuel Pruzansky, University of Illinois College of Medicine

9:55 a.m. Discussion

10:15 a.m. Adjournment

9:00-11:00 a.m. FILM THEATER

GENERAL SESSION
Presiding: Stanley Ainsworth, Florida State University

10:30 a.m. *The Significance of Our Profession.* Lee Edward Travis, University of Southern California

12:15 p.m. Adjournment

12:30-2:00 p.m. Luncheon meetings of various groups

STUTTERING
Chairman: Spencer F. Brown, University of Minnesota

2:30 p.m. *The Relation between Anxiety and Stuttering.* John Boland, Jr., University of Oklahoma

2:45 p.m. *An Evaluation of Masseter Muscle Action Potentials in Stuttered and Non-stuttered Speech.* Dean E. Williams, Florida State University

3:00 p.m. *Some Indians Who Stutter.* Edwin M. Lemert, University of California, Los Angeles

3:15 p.m. *A Comparison of Oral Reading and Spontaneous Speech of Stutterers with Special Reference to the Adaptation and Consistency Effects.* Edwin Cohen, Iowa City Veterans Hospital

3:30 p.m. *The Effect of Stuttering on Fear.* Joseph Sheehan, University of California, Los Angeles

3:45 p.m. Discussion

4:00 p.m. Adjournment

SYMPOSIUM ON PSYCHOGALVANIC SKIN RESPONSE AUDIOMETRY

Chairman: John H. Gaeth, Northwestern University

2:30 p.m. *The Adult Galvanic Skin Response to a Pure Tone Auditory Stimulus.* Kenneth C. Stewart, University of Pittsburgh

2:45 p.m. *The Galvanic Skin Response to a Pure Tone Auditory Stimulus in Conductively Deafened Individuals.* Katherine McClure, University of Pittsburgh

3:00 p.m. *A Summary of Findings and Significance of PGSR Audiometry with Children.* William G. Hardy and Miriam D. Pauls, Johns Hopkins University

3:20 p.m. Discussants: Helmer Myklebust, Northwestern University
Aram Glorig, Walter Reed General Hospital
Ira J. Hirsh, Central Institute for the Deaf and Washington University

3:35 p.m. Questions and comments

4:00 p.m. Adjournment

2:30-4:00 p.m. FILM THEATER

INTERROGATION OF 'EXPERTS'

Program organizer: Margaret Hall Powers, Chicago Public Schools

4:10 p.m. The following individuals will be available for questioning by the membership and others attending the conference.

Stuttering
Charles Van Riper, Western Michigan College of Education

Functional Articulation Problems
Stanley Ainsworth, Florida State University

Voice Disorders
Paul Moore, Northwestern University

Cleft Palate
Herbert Koepp Baker, University of Illinois College of Medicine

Cerebral Palsy
Harold Westlake, Northwestern University

Aphasia in Adults
Joseph Wepman, University of Chicago

Aphasia in Children
Helmer Myklebust, Northwestern University

Hard of Hearing Problems
Jacqueline Keaster, State University of Iowa

Crippled Children's Services
Jayne Shover, National Society for Crippled Children and Adults, Inc.

Public School Speech Correction
Margaret Hall Powers, Chicago Public Schools

State Speech Correction Programs
Martha E. Black, Illinois Office of Public Instruction

5:15 p.m. Adjournment

THE PRACTICE OF GROUP THERAPY

Chairman: Dale Lundeen, University of Minnesota

4:10 p.m. *The Role of the Therapist.* Bernard Jackson, Western Michigan College of Education

4:25 p.m. *Prognosis and Evaluation in Group Therapy.* George Shames, University of Pittsburgh

4:40 p.m. *The Practice of Group Therapy with Children.* Harriet Dunn, Vermont Society for Crippled Children

4:55 p.m. *The Practice of Group Therapy with Adults.* John O'Neill, Ohio State University

5:15 p.m. Adjournment

5:30-7:30 p.m. Reception for those attending the conference by the Michigan Speech Correction Association

8:00-9:00 p.m. Meeting of Supervisors of Public School Speech Correction

8:00-10:00 p.m. ASHA EXECUTIVE COUNCIL MEETING

8:00-10:00 p.m. FILM THEATER

Saturday, November 22

RESEARCH NEEDS, IMPLICATIONS, AND OPPORTUNITIES IN PUBLIC SCHOOL SPEECH CORRECTION

Chairman: Ruth Beckey Irwin, Ohio State University

9:00 a.m. *Needs and Opportunities in Research for Public School Speech Therapy as Observed by a State Supervisor.* Gretchen Mueller Phair, Wisconsin Department of Public Instruction

9:20 a.m. *Needs and Opportunities in Research for Public School Speech Therapy as Observed by a University Professor.* Ollie Backus, University of Alabama

9:40 a.m. *Implications of Present-Day Research for the Public School Therapists.* Eugene T. McDonald, Pennsylvania State College

10:00 a.m. Panel Discussion

10:30 a.m. Adjournment

EDUCATIONAL AND CLINICAL PROBLEMS IN AUDIOLOGY

Chairman: Hayes A. Newby, Stanford University

9:00 a.m. *The Hearing Defective Child and the Regular School.* John K. Duffy, Brooklyn College

9:15 a.m. *Bibliographical Sources on the Teaching of Speech to the Deaf in the United States, 1815-1868.* Powrie V. Doctor, Gallaudet College

9:30 a.m. *Recording of Audiologic Data with Rapid Recovery for Research and Clinic Use.* Wallace A. Goates, University of Utah

9:45 a.m. *An Evaluation of Two Pulse-type Tests of Hearing.* Thomas B. Anderson, Ohio State University

10:00 a.m. *An Experimental Comparison of the Test Results of the Phonograph and Pure Tone Audiometers.* James M. Mullendore and Malcolm B. McCoy, University of Virginia

10:15 a.m. Questions and discussion

10:30 a.m. Adjournment

10:40-12:00 m. BUSINESS MEETING OF ASHA MEMBERSHIP

PRACTICAL TECHNIQUES AND MATERIALS FOR USE IN PUBLIC SCHOOL SPEECH CORRECTION

Chairman: Dorothy Kester, Akron, Ohio, Public Schools

2:00 p.m. *Materials and Techniques in Diagnostic Testing.* Blanche A. Mendelson, New York City Public Schools

2:10 p.m. *Treatment of Stutterers between the Ages of 6-12.* Frank Robinson, Miami University

2:20 p.m. *Devices for Aiding Speech Development in Cerebral Palsy.* Irma Kratovil, Chicago Public Schools

2:30 p.m. *Treatment of Cleft Palate Speech and Related Voice Problems.* Loraine Wilson, Cleveland Public Schools.

2:40 p.m. *Techniques That Work with Articulatory Disorders.* Bonnie Hankammer, Akron Public Schools

2:50 p.m. Audience discussion

3:30 p.m. Adjournment

RESEARCH IN EXPERIMENTAL PHONETICS

Chairman: Wilbert Pronovost, Boston University

2:00 p.m. *An Experimental Study of Certain Relationships between Intelligibility Scores and Clinical Data of Persons with Defective Articulation.* V. P. Garwood, University of Southern California

2:20 p.m. *Personality Traits Related to Talker Intelligibility and Listener Accuracy.* B. Spilka, Air Corps Research, Randolph Field, and T. D. Hanley, Purdue University

2:40 p.m. *An Evaluation of Literature on Speech Sound Discrimination.* Barbara Ann Merritt, Redwood City, California, Public Schools

3:00 p.m. *An Experimental Investigation of Speech Disturbance as a Function of the Intensity of Delayed Auditory Feedback.* R. S. Brubaker, Pennsylvania State College

3:20 p.m. Discussion

3:30 p.m. Adjournment

3:30 p.m. ASHA EXECUTIVE COUNCIL MEETING

INDEX TO VOLUME 17, 1952

Journal of Speech and Hearing Disorders

Abstracts (of current articles). 78-84, 235-240, 356-361, 442-447
American Speech and Hearing Association
  By-Laws. 108-112
  Clinical Certification Requirements. 249-254
  Code of Ethics. 255-256
  Committee on the Midcentury White House Conference, Report of the, 129-137
  Convention
    Formal call for papers. 3, 115
    Program. 259, 454-459
    Report of council and business meetings. 95-107
  Honors of the Association. Hallowell Davis. 85-86
  Retiring President. M. D. Steer. 87
Accompaniments of word intelligibility (J. W. Black) 409-418
Anatomical and physiological approach, An. Congenital aphasia: (O. Sugar) 301-304
Anxiety in stuttering behavior, An experimental approach to expectancy and (G. J. Wischner) 139-154
Aphasia, Congenital: A case report (G. W. Gens and M. L. Bibey) 32-38
  An anatomical and physiological approach (O. Sugar) 301-304
Aphasic patients, A group discussion program with the families of (M. Turnblom and J. S. Myers) 393-396
Atkinson, C. J. A study of vocal responses during controlled aural stimulation. 419-426
Audiometer test, A recorded warble tone, suitable for group administration over loud-speakers (J. C. Webster) 213-223
Audiometry, Development of materials for speech (I. J. Hirsh, H. Davis, S. R. Silverman, E. G. Reynolds, E. Eldert and R. W. Benson) 321-337
  Group testing of school children by pure tone (S. F. Nielsen) 4-7
  The test situation in PGSR (W. G. Hardy and M. D. Pauls) 13-24
Aural stimulation, A study of vocal responses during controlled (C. J. Atkinson) 419-426
Autism theory of speech development and some clinical applications, The. Speech development in the young child: 1. (O. H. Mowrer) 263-268

Backus, O. The use of a group structure in speech therapy. 116-122
Bell, D. and Pross, E. L. A 'medicine bag' for the speech correctionist. 397-400
Benson, R. W. *See* Hirsh, I. J.
Berlinsky, S. Measurement of the intelligence and personality of the deaf: A review of the literature. 39-54
Bibey, M. L. *See* Gens, G. W.
Black, J. W. Accompaniments of word intelligibility. 409-418
Bloodstein, O., Jaeger, W. and Tureen, J. A study of the diagnosis of stuttering by parents of stutterers and non-stutterers. 308-315
Bloomer, H. and Shohara, H. Speech disorders among European military personnel in World War I: Part 2. 55-69
Book Reviews. 70-77, 229-234, 348-355, 436-441
Brown, S. F. Editorial. 260-262

Case report, A. Congenital aphasia: (G. W. Gens and M. L. Bibey) 32-38
Carrell, J. A cinefluorographic technique for the study of velopharyngeal closure. 224-228
Cerebral palsied children, An experimental study of sound pressure level and duration in the speech of (M. Hyman) 295-300
Child, Speech development in the young:
  1. The autism theory of speech development and some clinical applications (O. H. Mowrer) 263-268

2. Some factors related to the speech development of the infant and young child (O. C. Irwin) 269-279
3. The development of certain language skills in children (M. C. Templin) 280-285
Children, An experimental study of sound pressure level and duration in the speech of cerebral palsied (M. Hyman) 295-300
Speech and language problems of mentally deficient (I. W. Karlin and M. Strazzulla) 286-294
Group testing of school, by pure tone audiometry (S. F. Nielsen) 4-7
Cinefluorographic technique for the study of velopharyngeal closure (J. Carrell) 224-228
Cleft palate care, Research and service combined for complete (W. B. Slaughter and G. M. Phair) 123-128
Clergymen, Speech correction referral ideas of (C. J. Kirkpatrick) 305-307
Clinical and experimental use of the Iowa scale of severity of stuttering (D. Sherman) 316-320
Clinical applications, The autism theory of speech development and some. Speech development in the young child: 1. (O. H. Mowrer) 263-268
Congenital aphasia: A case report. (G. W. Gens and M. L. Bibey) 32-38
An anatomical and physiological approach (O. Sugar) 301-304
Consonants, The influence of vowels on (D. Sherman) 198-212
Construction of one-way vision mirrors (M. F. Palmer) 138

Davis, H. Information theory: 3. Applications of information theory to research in hearing. 189-197
See also Hirsh, I. J.
Deaf, Measurement of the intelligence and personality of the: A review of the literature (S. Berlinsky) 39-54
Development of materials for speech audiometry (I. J. Hirsh, H. Davis, S. R. Silverman, E. G. Reynolds, E. Eldert and R. W. Benson) 321-337
Differentiation of interiorized and exteriorized secondary stuttering, The (E. Douglass and B. Quarrington) 377-385
Douglass, E. and Quarrington, B. The differentiation of interiorized and exteriorized secondary stuttering. 377-385
Duration in the speech of cerebral palsied children, An experimental study of sound pressure level and (M. Hyman) 295-300

Editorial (S. F. Brown) 260-262
Efficient group screening test, An (P. W. Johnston) 8-12
Eldert, E. *See* Hirsh, I. J.
European military personnel in World War I, Speech disorders among: Part 2 (H. Bloomer and H. Shohara) 55-69
Expectancy and anxiety in stuttering behavior, An experimental approach to (G. J. Wischner) 139-154
Experimental approach to expectancy and anxiety in stuttering behavior, An (G. J. Wischner) 139-154
Experimental phonetics, Applications of information theory to research in (G. E. Peterson) 175-188
Experimental study of sound pressure level and duration in the speech of cerebral palsied children, An (M. Hyman) 295-300

Factors associated with help obtained from individual hearing aids (B. M. Siegenthaler and G. H. Gunn) 338-347

Gens, G. W. and Bibey, M. L. Congenital aphasia: A case report. 32-38
Group discussion program with the families of aphasic patients, A (M. Turnblom and J. S. Myers) 393-396
Group structure in speech therapy, The use of a (O. Backus) 116-122
Group testing of school children by pure tone audiometry (S. F. Nielson) 4-7
Gunn, G. H. *See* Siegenthaler, B. M.

Hardy, W. G. and Pauls, M. D. The test situation in PGSR audiometry. 13-24
Harsh voice quality, The influence of certain vowel types on degree of (D. Sherman and E. Linke) 401-408

Hearing aids, Factors associated with help obtained from individual (B. M. Siegenthaler and G. H. Gunn) 338-347
Hearing, Applications of information theory to research in (H. Davis) 189-197
Hirsh, I. J., Davis, H., Silverman, S. R., Reynolds, E. G., Eldert, E. and Benson, R. W. Development of materials for speech audiometry. 321-337
Hyman, M. An experimental study of sound pressure level and duration in the speech of cerebral palsied children. 295-300

Index to Volume 17, *Journal of Speech and Hearing Disorders*. 460-464
Infant and young child, Some factors related to the speech development of the. Speech development of the young child: 2. (O. C. Irwin) 269-279
Influence of certain vowel types on degree of harsh voice quality, The (D. Sherman and E. Linke) 401-408
Influence of vowels on recognition of adjacent consonants, The (D. Sherman) 198-212
Information theory:
1. Information theory—A non-technical review (W. Weaver) 166-174
2. Applications of information theory to research in experimental phonetics (G. E. Peterson) 175-188
3. Applications of information theory to research in hearing (H. Davis) 189-197
Intelligence and personality of the deaf, Measurement of the: A review of the literature. (S. Berlinsky) 39-54
Intelligibility, Accompaniments of word (J. W. Black) 409-418
Investigation of prognosis and evaluation in speech therapy, An (G. Shames) 386-392
Iowa scale of severity of stuttering, Clinical and experimental use of the (D. Sherman) 316-320
Irwin, O. C. Speech development in the young child: 2. Some factors related to the speech development of the infant and young child. 269-279

Johnston, P. W. An efficient group screening test. 8-12

Karlin, I. W. and Strazzulla, M. Speech and language problems of mentally deficient children. 286-294
Kirkpatrick, C. J. Speech correction referral ideas of clergymen. 305-307

Language problems of mentally deficient children, Speech and (I. W. Karlin and M. Strazzulla) 286-294
Language skills in children, The development of certain. Speech development in the young child: 3. (M. C. Templin) 280-285
Letters to the editor. 433-435
Linke, E. *See* Sherman, D.

Measurement of the intelligence and personality of the deaf: A review of the literature (S. Berlinsky) 39-54
'Medicine bag' for the speech correctionist, A (D. Bell and E. L. Pross) 397-400
Mentally deficient children, speech and language problems of (I. W. Karlin and M. Strazzulla) 286-294
Mirrors, Construction of one-way vision (M. F. Palmer) 138
Moncur, J. P. Parental domination in stuttering. 155-165
Moore, W. E., Soderberg, G. and Powell, D. Relations of stuttering in spontaneous speech to speech content and verbal output. 371-376
Morley, D. E. A ten-year survey of speech disorders among university students. 25-31
Mowrer, O. H. Speech development in the young child: 1. The autism theory of speech development and some clinical applications. 263-268
Myers, J. S. *See* Turnblom, M.

News and announcements. 88-94, 241-248, 362-368, 448-453
Nielsen, S. F. Group testing of school children by pure tone audiometry. 4-7

Palmer, M. F. Construction of one-way vision mirrors. 138
Parameter relationships in the portrayal of signals with sound spectrograph techniques (G. E. Peterson) 427-432

Parental domination in stuttering (J. P. Moncur) 155-165
Pauls, M. D. *See* Hardy, W. G.
Personality of the deaf, Measurement of the intelligence and: A review of the literature (S. Berlinsky) 39-54
Peterson, G. E. Information theory: 2. Applications of information theory to research in experimental phonetics. 175-188
Parameter relationships in the portrayal of signals with sound spectrograph techniques. 427-432
Phair, G. M. *See* Slaughter, W. B.
Physiological approach, An anatomical and: Congenital aphasia (O. Sugar) 301-304
Prognosis and evaluation in speech therapy, An investigation of (G. Shames) 386-392
Pross, E. L. *See* Bell, D.

Quarrington, B. *See* Douglass, E.

Recorded warble tone audiometer test suitable for group administration over loudspeakers, A (J. C. Webster) 213-223
Referral ideas of clergymen, Speech correction (C. J. Kirkpatrick) 305-307
Relations of stuttering in spontaneous speech to speech content and verbal output (W. E. Moore, G. Soderberg and D. Powell) 371-376
Research and service combined for complete cleft palate care (W. B. Slaughter and G. M. Phair) 123-128
Reynolds, E. G. *See* Hirsh, I. J.

Shames, G. An investigation of prognosis and evaluation in speech therapy. 386-392
Sherman, D. Clinical and experimental use of the Iowa scale of severity of stuttering. 316-320
Influence of vowels on recognition of adjacent consonants, The 198-212
Sherman, D. and Linke, E. The influence of certain vowel types on degree of harsh voice quality. 401-408
Shohara, H. *See* Bloomer, H.
Siegenthaler, B. M. and Gunn, G. H. Factors associated with help obtained from individual hearing aids. 338-347
Silverman, S. R. *See* Hirsh, I. J.
Slaughter, W. B. and Phair, G. M. Research and service combined for complete cleft palate care. 123-128
Sound pressure level and duration in the speech of cerebral palsied children, An experimental study of (M. Hyman) 295-300
Sound spectrograph techniques, Parameter relationships in the portrayal of signals with (G. E. Peterson) 427-432
Speech and language problems of mentally deficient children (I. W. Karlin and M. Strazzulla) 286-294
Speech audiometry, Development of materials for (I. J. Hirsh, H. Davis, S. R. Silverman, E. G. Reynolds, E. Eldert and R. W. Benson) 321-337
Speech correction, Speech disorders and (ASHA Committee on Midcentury White House Conference) 129-137
Speech correction referral ideas of clergymen (C. J. Kirkpatrick) 305-307
Speech correction, 'medicine bag' for the, A (D. Bell and E. L. Pross) 397-400
Speech development in the young child:
1. The autism theory of speech development and some clinical applications (O. H. Mowrer) 263-268
2. Some factors related to the speech development of the infant and young child (O. C. Irwin) 269-279
3. The development of certain language skills in children (M. C. Templin) 280-285
Speech disorders among European military personnel in World War I: Part 2. (H. Bloomer and H. Shohara) 55-69
Speech disorders among university students, A ten-year survey of (D. E. Morley) 25-31
Speech disorders and speech correction (ASHA Committee on Midcentury White House Conference) 129-137
Speech therapy: An investigation of prognosis and evaluation in (G. Shames) 386-392
The use of a group structure in (O. Backus) 116-122

Study of vocal responses during controlled aural stimulation, A (C. J. Atkinson) 419-426
Strazzulla, M. *See* Karlin, I. W.
Study of the diagnosis of stuttering by parents of stutterers and non-stutterers, A (O. Bloodstein, W. Jaeger and J. Tureen) 308-315
Stuttering behavior, An experimental approach to expectancy and anxiety in (G. J. Wischner) 139-154
Stuttering, Clinical and experimental use of the Iowa scale of severity of (D. Sherman) 316-320
Differentiation of interiorized and exteriorized secondary, The (E. Douglass and B. Quarrington) 377-385
Parental domination in (J. P. Moncur) 155-165
Study of the diagnosis of, by parents of stutterers and non-stutterers, A (O. Bloodstein, W. Jaeger and J. Tureen) 308-315
Stuttering in spontaneous speech, Relations of, to speech content and verbal output (W. E. Moore, G. Soderberg and D. Powell) 371-376
Stutterers and non-stutterers, A study of the diagnosis of stuttering by parents of (O. Bloodstein, W. Jaeger and J. Tureen) 308-315
Sugar, O. Congenital aphasia: An anatomical and physiological approach. 301-304
Survey of speech disorders among university students, A ten-year (D. E. Morley) 25-31

Templin, M. C. Speech development in the young child: 3. The development of certain language skills in children. 280-285
Ten-year survey of speech disorders among university students, A (D. E. Morley) 25-31
Test, An efficient group screening (P. W. Johnston) 8-12
A recorded warble tone audiometer, suitable for group administration over loudspeakers (J. C. Webster) 213-223
Test situation in PGSR audiometry, The (W. G. Hardy and M. D. Pauls) 13-24
Testing, Group, of school children by pure-tone audiometry (S. F. Nielsen) 4-7
Therapy, An investigation of prognosis and evaluation in speech (G. Shames) 386-392
The use of a group structure in speech (O. Backus) 116-122
Turnblom, M. and Myers, J. S. A group discussion program with the families of aphasic patients. 393-396

University students, A ten-year survey of speech disorders among (D. E. Morley) 25-31
Use of a group structure in speech therapy, The (O. Backus) 116-122

Velopharyngeal closure, A cinefluorographic technique for the study of (J. Carrell) 224-228
Voice quality, The influence of certain vowel types on degree of harsh (D. Sherman and E. Linke) 401-408
Vowel types, The influence of certain, on degree of harsh voice quality (D. Sherman and E. Linke) 401-408
Vowels, The influence of adjacent consonants on (D. Sherman) 198-212

Weaver, W. Information theory: 1. Information theory—A non-technical review. 166-174
Webster, J. C. A recorded warble tone audiometer test suitable for group administration over loudspeakers. 213-223
Wischner, G. J. An experimental approach to expectancy and anxiety in stuttering behavior. 139-154
World War I, Speech disorders among European military personnel in: Part 2. (H. Bloomer and H. Shohara) 55-69